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pp.119-178.] [February 14, 1914.

TROPICAL DISEASES BULLETIN

Vol. 3. 1914. No. 3.

EXCHANGE COPY

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THE DIRECTION OF THE
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OF THE
TROPICAL DISEASES
BUREAU.

General Editor:
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COMMONWEALTH MYCOLOGICAL INSTITUTE
26 MAY 1971

London:
TROPICAL DISEASES BUREAU,
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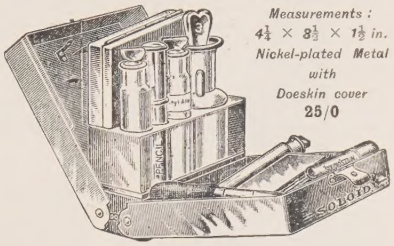

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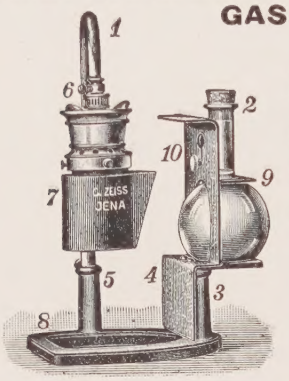

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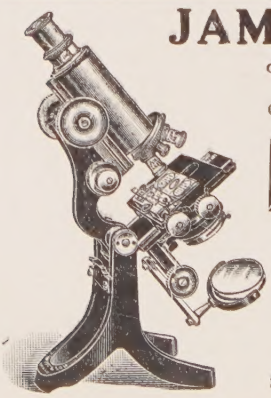

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TROPICAL DISEASES BULLETIN.

Vol. 3.] 1914. [No. 3.

PROTOZOOLOGY.

JOYEUX (C.). **Note sur quelques Protozoaires sanguicoles et intestinaux observés en Guinée francaise.**—*Bull. Soc. Path. Exot.* 1913. Nov. Vol. 6. No. 9. pp. 612–615.

The author records the finding of trypanosomes in 30 horses, seven of which died. Some of the trypanosomes are undetermined, but three of the hosts were infected with *T. cazalboui* (associated in one case with *T. dimorphon*). Of 16 other horses examined, seven only showed trypanosomes, two of these being infections of *T. cazalboui*, one of *T. dimorphon*, the others undetermined.

Among 19 donkeys examined, four never showed parasites, four died of trypanosomiasis (one of *T. cazalboui* and *T. pecaudi* mixed), and of the 11 others three showed *T. cazalboui*. The remaining trypanosomes were not determined.

Cattle born in the country, but of a stock originally coming from Fouta-Djallon, and of small size, never showed parasites. Cattle imported from Haut-Sénégal-Niger showed trypanosomes (six out of 50, in two cases *T. cazalboui*).

Native sheep were not very susceptible to *T. dimorphon*.

Among Cercopithecus monkeys *Plasmodium kochi* was seen in three out of nine examined.

The land tortoise, *Cinixys belliana*, is frequently parasitised (19 out of 34) by *Plasmodium roumei*.

Rats frequently contained *T. lewisi*, and *Grahamella* was seen in *Golunda fallax* and *Mus rattus*.

Stools of patients were examined for Protozoa. In 14 per cent. of those showing intestinal symptoms amoebae were found, sometimes exhibiting the characters of *Entamoeba tetragena*. By experiment the author found that native cats seemed to exhibit a certain immunity

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to *E. tetragena*. *Balantidium coli* was seen in the stools of a Cynocephalus suffering from slight diarrhoea.

H. B. Fantham.

Rodhain (J.), Pons (C.), van den Branden (F.) & Bequaert (J.). **Rapport sur les Travaux de la Mission Scientifique du Katanga (Oct. 1910 à Sept. 1912).**—1913. Brussels: Hayez, Imprimeur de l'Académie Royale. [Royaume de Belgique—Ministère des Colonies.] Ch. 4 & 5, pp. 117–162.

Chapter IV of this report deals more especially with insect flagellates.

Leptomonas davidi was found in the latex of *Euphorbia indica;* it is probably spread by Hemiptera. A Leptomonas from several species of *Asilus* is figured; also a Leptomonas from the gut of the reduviid *Rhinocoris albopilosus*. Another *Rhinocoris albopilosus* showed a separate flagellate, *Crithidia vacuolata* n. sp. In one specimen of *Cosmolestes pictus* a Leptomonas was found.

Among phytophagous Hemiptera, a Leptomonas was found in the gut of *Serinetha fraterna*. This flagellate is figured, and is named *L. serinethae*. A Leptomonas from *Serinetha amicta* is also figured, and another one from *Cletus bisbipunctatus*. A new specific name (*L. mirperi*) is given to the flagellate found in the gut of *Mirperus jaculus*, and there are figures of the parasite. A Crithidia from the gut of a larva of *Pirrhocorides* is figured.

A long description is given of *Crithidia pangoniae* (see this *Bulletin*, Vol. 2, p. 51). *Crithidia tenuis*, from the gut of *Chrysozona vanden brandeni*, n. sp., is described and figured.

Chapter V deals chiefly with Haemosporidia. The work has already been summarized in this *Bulletin*, Vol. 2, p. 259. [See also this *Bulletin*, Vol. 1, p. 125, for remarks on *Trypanosoma denysi*.]

H. B. F.

Minchin (E. A.) **Report of the Professor of Protozoology at the University of London for the Year ending June 30th, 1913.**—Report to the Advisory Committee for the Tropical Diseases Research Fund. Received in Colonial Office, Aug. 20, 1913.

The Report contains an account of the personal investigations and teaching of the Professor of Protozoology, and of the investigations of those working in his department.

Professor Minchin and Dr. J. D. Thomson have continued their work on *Trypanosoma lewisi*. By a number of ingenious experiments they have shown that their previous opinion that in transmission "the trypanosome was regurgitated forward from the stomach of the flea, through the proboscis, and entered the rat by inoculation through the skin," is not supported, but that Nöller's conclusion, supported by Wenyon, that the rat becomes infected by licking the faeces of the rat flea, containing *T. lewisi*, off the skin, is accurate. They also show that the infection does not pass directly through the skin of the rat from faeces deposited upon it. Further experiments showed that "a rat can only be infected through having eaten an infected flea, if the developmental cycle of the trypanosome has been completed in the flea."

Various workers have been engaged in the study of technique and in research on various subjects during the year, the research comprising work on Kurloff bodies, protozoa of the soil, and *Toxoplasma gondii*. A brief résumé of Miss PIXELL'S work on the latter organism is given. [This paper has now been published, and is reviewed below.]

Dr. WOODCOCK contributes a notice of his work on *Selenomastix* from the rumen of the goat, this being the organism recorded by CERTES, and regarded by him as representing a flagellate of the genus *Ancyromonas*. Oval and crescentic forms were found. The crescentic organism has always a homogeneous appearance, it possesses a single flagellum, and "there is no properly constituted nucleus," granules of chromatin only occurring. Oval forms are without flagella. The affinities of the organism are uncertain.

Parasites of the genus *Bodo* (in the wide sense) also were examined in cultures of goat dung. *Crithidia fasciculata* from *Culex pipiens* were examined, but no evidence was obtained that they were other than natural parasites of the gnat. Larvae of the gnat were uninfected. The author makes a number of "suppositions" as to the Haemoflagellate origin of the Crithidia.

Work on the transmission of blood parasites of the chaffinch, by the agency of bird fleas (*Ceratophyllus gallinae*), has continued to yield negative results. *Halteridium fringillae* is rapidly digested in the flea's stomach. More work on the subject is in progress.

H. B. F.

VISENTINI (Arrigo). **Gli Emoparassiti della Talpa in Italia.** [Blood Parasites of the Mole in Italy.]—*Arch. f. Protistenkunde.* 1913. Dec. 11. Vol. 32. No. 2. pp. 257–266. With 1 coloured plate.

The author's investigations were made on moles in Northern Italy, during springtime. Thirty per cent. of the moles were parasitised by *Trypanosoma talpae*, and 4·34 per cent. by *Elleipsisoma thomsoni*. Visentini found these parasites to possess the same morphological characters as previously described by J. D. THOMSON and FRANÇA respectively. He also found that co-existent with the trypanosome there were endoglobular vermicular parasites, analogous to those described by WRUBLEWSKI in Russia as *Elleipsisoma*, but which, in Visentini's opinion, were somewhat different.

The author also observed red corpuscles containing minute bacilliform or diplococcoid structures, the *Grahamella talpae* of BRUMPT, the parasitic nature of which is still uncertain.

H. B. F.

NÖLLER (W.). **Die Blutprotozoen des Wasserfrosches und ihre Uebertragung.** [Blood Protozoa of Water-Frogs and their Transmission.]—*Arch. f. Protistenkunde*, 1913. Oct. 10. Vol. 31. No. 2. pp. 169–240. With 3 plates & 5 text figs.

A preliminary account of some of these researches was reviewed in this *Bulletin*, Vol. 1, p. 497.

The author notes the various worms found in the common water-frog, and describes several blood protozoa also occurring therein. The Protozoa include:—*Trypanosoma rotatorium*, which is transmitted especially from tadpole to tadpole by *Hemiclepsis*. The form

of the parasite in the tadpole is slightly different from that in the adult frog. In transmission the incubation period is from five to six days, and the first trypanosomes are few in number, and are small. Nöller distinguishes three types in the frog's blood: (i) tadpole type; (ii) thick, large forms; (iii) forms with elongate, spindle-shaped nuclei. Cultures were made on sheep-blood-agar and subcultures in the condensation water of blood-agar and blood-bouillon. The author also discusses what physiological, physical and chemical factors determine the growth and form of the trypanosome. He considers that *T. costatum*, *T. loricatum*, *T. hylae*, *T. mega*, and *T. chattoni* are synonyms for *T. rotatorium*, while *T. elegans*, *T. undulans*, and *T. hendersoni*, are synonymous with *T. inopinatum*.

Dactylosoma ranarum is also considered, the author describing the appearance of the living organism, the growing and ripe schizonts, and forms which perhaps represent gamete formation.

Lankesterella minima, Chaussat 1850, emend. Hintze 1902, was also found. As synonyms, Nöller places *Anguillula minima*, *Drepanidium ranarum* Lankester, *Drepanidium princeps*, *Drepanidio piccolo*, *Lankesterella ranarum* and *Haemogregarina minima*. The ordinary growing forms were chiefly seen. Schizogony was uncommon, and was seen only in macrophages, endothelial cells or within internal organs (spleen and liver). *Hemiclepsis marginata* was shown to contain parasites in its stomach on the first day after feeding, and from the fourth day in the gut epithelium. The author also notes that *Isospora lieberkühni* and *Eimeria prevoti* may occur in frogs. The three plates depict stages of the organisms described.

H. B. F.

Laveran (A.) & Franchini (G.). **Infections expérimentales de Mammifères par des Flagellés du Tube digestif de** *Ctenocephalus canis* **et d'***Anopheles maculipennis*.—*Compt. Rend. Acad. Sciences.* 1913. Nov. 4. Vol. 157. No. 18. pp. 744–747.

The experiments detailed in the paper were in continuation of those reviewed in this *Bulletin*, Vol. 2, p. 463.

(1) The authors succeeded in infecting several mice, a white rat and a dog with *Herpetomonas ctenocephali*. Five mice, inoculated either intraperitoneally or subcutaneously with the contents of parasitised dog fleas, became infected. Nine mice, inoculated intravenously or intraperitoneally, or with blood from the liver or spleen of infected mice, became infected—in five cases from the first passage, in two cases from the second passage, and in two other cases from the third passage. Seven of the mice died naturally, or were killed when very ill. The Herpetomonas is, then, pathogenic to the mouse. The duration of the disease in mice varied from 24 to 123 days, average 61 days. The spleen was often a little hypertrophied. Flagellate forms of the parasite were very rare in the inoculated mice, leishmania forms were common. The parasites were most numerous in the liver.

The white rat was inoculated with heart blood from an infected mouse. Two months after, leishmaniform elements were seen in the peripheral blood.

The dog was inoculated twice intraperitoneally with liver and spleen emulsion of an infected mouse, and a third time, intravenously, with

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Crithidia hyalommae.

EXPLANATION OF PLATE.

The figures in the original plates were outlined with the Abbé-Zeiss camera lucida, after magnification with a 2 mm. apochromatic objective (Zeiss) with No. 12 compensating ocular.

The magnification is approximately 2,000 diameters

FIGS. 1-2—Early pre-flagellate forms of *Crithidia hyalommae* from the haemocoelic fluid.

FIG. 3.—Plasmodial form from haemocoelic fluid.

FIG. 4.—Fully grown Crithidia from haemocoelic fluid showing rod-shaped blepharoplast.

FIG. 5.—Commencing division of blepharoplast: diplosome blepharoplast shown.

FIG. 6.—Shows aggregation rosette of ovarian stages in walls of oviduct

FIG. 7.—Resting and division stages in ovarian cell.

FIG. 8.—Plasmodial form in deposited ovum.

(Redrawn from Captain W.R. O'FARRELL'S Plates.)

infected mouse-blood. It died 50 days after the first inoculation. Leishmaniform elements were found in the liver, spleen, axillary glands, and bone marrow.

Two Macacus monkeys inoculated subcutaneously have not yet shown infection.

(2) Experiments with *Crithidia fasciculata*, from the digestive tract of *Anopheles maculipennis*.

Two white rats and three white mice were inoculated with the contents of ten parasitised Anopheles. The two rats and two of the mice became infected. The rats were inoculated intraperitoneally and died in about a month, leishmaniform parasites occurring in them.

The mice were inoculated intraperitoneally, two directly from Anopheles, and one from one of the rats above-mentioned. The last-mentioned mouse died in 12 days. Leishmaniform parasites were seen in all the inoculated mice. Hence *Crithidia fasciculata* can produce infections in rats and mice.

In all the animals successfully infected, leishmaniform elements were found in the peripheral blood, liver and spleen. Flagellate forms of *Crithidia fasciculata* were never seen in the inoculated vertebrates.

H. B. F.

O'Farrell (W. R.). **Hereditary Infection, with Special Reference to its Occurrence in *Hyalomma aegyptium* infected with *Crithidia hyalommae*.**— *Ann. Trop. Med. & Parasitol.* 1913. Dec. 30. Vol. 7. No. 4. pp. 545–562. With 3 plates.

A short review of O'Farrell's preliminary note on *Crithidia hyalommae* stated that the full paper would be awaited with interest (this *Bulletin*, Vol. 2, p. 465.) The present paper amply fulfils the expectation. The author describes and illustrates very fully the phases of the Crithidia found in the haemocoelic fluid and ovarian tract of *Hyalomma aegyptium*, the common cattle tick of the Anglo-Egyptian Sudan. The preflagellate stage of the Crithidia is of short duration. The parasites are oval or rounded bodies, 4μ to 11μ broad. Division occurs among them. The flagellates vary from 26μ to 50μ in length, and from 2μ to 2·5μ in breadth. The blepharoplast is in the immediate neighbourhood of the nucleus. The postflagellate and ovarian stages occur in the haemocoelic fluid, ovary and oviducts.

About the time of oviposition, and during this event, the flagellates pass by means of the haemocoelic fluid to the ovary and oviducts. A large number of them enter (by their non-flagellar ends) the walls and cells of these organs. There the flagella are absorbed and a Leishmania-like form is assumed. A considerable number of parasites pierce the walls of the ova, more than one parasite often entering the same ovum. Once within the egg, the Leishmania-like form is produced. Subsequently division of the parasite occurs so that large "plasmodial" forms are found. These ultimately break up into smaller resting bodies. All stages in this division have been followed. The resting (post-flagellate) forms occur most frequently in the later deposited ova, while the ova deposited early in oviposition are usually uninfected. Many of the ova of infected ticks dry up and die.

The infection of *Hyalomma aegyptium* by *Crithidia hyalommae* is

purely an hereditary infection, and the Crithidia is a strictly parasitic flagellate of the tick. The author clearly showed this, as attempts at cultivation of the flagellates and cultures of the blood of cattle harbouring ticks, as well as experimental inoculations of cattle with the flagellates, all gave negative results.

The paper is well illustrated by three plates depicting all the phases described.

[The mode of hereditary infection of *Hyalomma aegyptium* by *C. hyalommae*, as described by the present author, is thus on the same lines as that of *Melophagus ovinus* by *C. melophagia*, as described by Porter (1910), to whose work O'Farrell refers. It also emphasizes the need of research on haemocoelic and ovarian infections by flagellates, especially those of insects suspected of spreading disease.]

H. B. F.

Fantham (H. B.) & Porter (Annie). *Herpetomonas stratiomyiae* **n. sp., a Flagellate Parasite of the Flies,** *Stratiomyia chameleon* **and** *S. potamida*, **with Remarks on the Biology of the Hosts.** —*Annals. Trop. Med. & Parasit.* 1913. Dec. 30. Vol. 7. No. 4. pp. 609–620. With 1 plate.

The special interest of the paper lies in the tracing of the developmental stages of *Herpetomonas stratiomyiae* through the metamorphosis of the insect hosts, *Stratiomyia chameleon* and *S. potamida*. Larvae, pupae and imagines are infected. Preflagellate, flagellate, and post-flagellate stages occur in the gut of the larvae.

Just prior to pupation, the flagellates migrate from the gut of the larva into the haemocoel, where they gradually become motionless, withdraw their flagella, and assume the post-flagellate form. They collect in the more fluid parts of the body of the pupa, and, ultimately, as a result of this, they become enclosed in the gut of the adult.

The imago, if formed from an infected pupa, usually emerges from the pupa case infected with non-flagellate forms of the herpetomonad. The development of the non-flagellate into the flagellate form is rapid, and soon all stages of the organism are present.

Infection of the larvae is contaminative, that of the pupa is transmitted from the larva, while the imago may retain the pupal infection or may possibly acquire it *ab initio*, by ingesting contaminated food.

It is suggested that the coincident cyclical development of the flagellate parasite and the insect host may be of practical application in the study of "leishmaniasis in the making," as recently described by Laveran and Franchini (see this *Bulletin*, Vol. 2, p. 463, and above.)

W. Yorke.

von Rátz (Stephan). **Trichomonas aus der Leber der Tauben.** [Trichomonas from the Liver of Pigeons.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Oct. 4. Vol. 71. Nos. 2/3. pp. 184–189.

The author gives first a resumé of the literature relating more especially to the Trichomonas found in pigeons, and then a short account of his own investigations. The birds affected were chiefly young ones. The liver was enlarged and adherent to the stomach-wall. The capsule of the liver was greyish or canary yellow. The surface of this organ was mottled and uneven, cheesy areas being

present in section. The cheesy masses contained numerous flagellates, showing vigorous movements. The parasites were mostly pyriform, or oval, the posterior end often rounded. At the anterior pole three flagella arose, and an undulatimg membrane was present. The body of the flagellate is colourless, with granular protoplasm. The blepharoplast is distinct. The nucleus is a somewhat elongate oval, and round vacuoles are present. The diameter of the roundish forms reaches 8·4μ. The exact method of infection of the liver was not ascertained.

Trichomonas columbae is considered to be a facultative parasite which, under certain circumstances, occurs in the gut, and can pass thence into the liver substance, either through the gut-wall, or by way of the bile duct.

H. B. F.

Gelei (J.). **Bau, Teilung und Infektionsverhältnisse von *Trypanoplasma dendrocoeli* Fantham.**—*Arch. f. Protistenkunde.* 1913. Nov. 11. Vol. 32. No. 1. pp. 171-204. With 1 plate and 1 text-fig.

The author, whilst engaged in ovogenetic studies on the flatworm, *Dendrocoelum lacteum*, found the flagellate, *Trypanoplasma dendrocoeli*, first recorded and described by Fantham and Porter jointly. [Not, as in the title, by one of these authors. See *Proc. Zool. Soc. Lond.*, 1910, p. 670.] He gives an account of the movements and structure of the parasite, which agrees in all essentials with the original account. The division of the nucleus, blepharoplast and flagellum is described. The author claims as an important part of his research the establishment of an intracellular stage of *T. dendrocoeli*. [Fantham and Porter found such intracellular stages in the ovary and eggs of the Dendrocoels.] Gelei has found intracellular forms in phagocytic gut cells, in epithelial pits of the pharynx, in non-epithelial pharynx tissue and in the epithelial tissue of the bursa copulatrix, vagina, large cells of oviduct, seminal tube and penis. Hereditary infection was not found. Infection of the host is stated to occur during coitus.

H. B. F.

Lewin (Kenneth R.). **The Nuclear Structure and the Sporulation of *Agrippina bona* Strickland.**—*Parasitology.* 1913. Oct. Vol. 6. No. 3. pp. 257–264. With 1 plate and 8 text figs.

The author gives an account of the nuclear structure of the trophozoite, the nuclear changes in the cyst, the formation of gametes, zygosis and the spores of the gregarine, *Agrippina bona*, parasitic in the gut of the larva of the rat-flea, *Ceratophyllus fasciatus*. There is a slight difference between the gametes formed by the two individuals associated in a cyst, but both sorts of gametes are non-motile. In conclusion, the author adopts Strickland's view and for the present regards "*Agrippina* as the representative of a new family of Gregarines." The paper is illustrated by a plate of 15 figures. [It is to be regretted that the magnifications of these figures are not stated.]

H. B. F.

Walker (J.). **A Short Note on the Occurrence of a Leucocytozoon Infection. Host the Ostrich.**—*Union of S. Africa, Dept. of Agriculture. Second Report of the Director of Veterinary Research*, 1912. Oct. pp. 384–386. With 2 plates. (1913, Cape Times, Ltd., Govt. Printers.)

The parasite, a Leucocytozoon, was found in the blood when the author was examining ostrich chicks in the Middelburg district, Cape Province. The blood smears used were dried, fixed in alcohol and stained with Giemsa. Male and female gametocytes were found, the female parasites being the more numerous. The shape of the parasite varies; it is usually more or less rounded. The size varies from 11 to 15μ by 9 to 13μ. The protoplasm of the female gametocyte stains more deeply than that of the male. The nucleus of the male is more scattered than that of the female. Generally the male parasite is the smaller in size.

The nucleus of the host cell is altered in shape, becoming elongate, and it is situate at the edge of the parasite. No spindle shaped alteration of the form of the host cell has so far been observed.

The name *Leucocytozoon struthionis* is proposed for the parasite.

The two plates illustrating the paper are reproductions of photographs of blood smears, but, unfortunately, they are not very clear or detailed.

H. B. F.

Henry (Herbert). **A Consideration of the Infective Granule in the Life History of Protist Organisms.**—*Jl. Pathology & Bacteriology.* 1913. Oct. Vol. 18. No. 2. pp. 250–258.

This paper gives a somewhat diffuse history of the phenomena of "granule shedding" as observed by many workers on various Protozoa. The author then discusses the two main hypotheses with regard to these granular products, namely, that they are degeneration products, or that they are essential features in the life-history of the organisms concerned. An interesting speculation as to the existence of a "primordial chromatin granule" and its subsequent "acquisition of protoplasm," with a possible application to the "classification of the Haemosporidia" "on phylogenetic principles," concludes the article.

The author mentions in the course of the paper granule-shedding in trypanosomes and *Leishmania*, coccoid bodies in spirochaetes, *Anaplasma*, *Grahamella* and *Haemogregarina simondi*.

H. B. F.

Henry (Herbert). **The Granule Shedding of** *Haemogregarina simondi*. —*Jl. Pathology & Bacteriology.* 1913. Oct. Vol. 18. No. 2. pp. 240–249. With 3 plates.

The author discusses the structure of *Haemogregarina simondi* in the sole, and deals more particularly with the extrusion of granules from the nucleus in the living organism and with the appearance of the same as seen in fixed and stained preparations. The paper thus covers much the same ground as one previously reviewed (see this *Bulletin*, Vol. 1, p. 264). In the final discussion, the author states that "in considering the nature of any chromatin-like granule occurring in a

Protozoon one must bear in mind . . . A.—In the first place, it may be something other than chromatin," *e.g.* volutin or a centrosome. . . . "B.—A free chromatin granule in the cytoplasm of a protozoon may be (1) a kineto-nucleus . . . (2) a karyosome . . . . (3) a chromidial granule, using the term in its widest sense."

H. B. F.

Pixell (Helen L. M.). **Notes on *Toxoplasma gondii*.**—*Proc. Roy. Soc.* 1913. Oct. 1. Series B. Vol. 87. No. B592. pp. 67–77. With 1 plate.

The paper first gives a general account of *Toxoplasma gondii*, in which the work of previous authors is mentioned. A section then deals with the distribution of the parasite in the host, and covers much the same ground as was reviewed recently in this *Bulletin* [vol. 2, pp. 259-261.] In addition, pavement epithelial cells of the omentum were found to be parasitised, as was also the subserous areolar tissue. The general effects of *T. gondii* on mice agree with those obtained by previous workers. Wet and dry methods of fixation were used, and the ordinary stains either alone or in combination were employed.

Details regarding the movements of the parasite are somewhat vague. Refringent granules were seen in some living specimens. The nucleus is usually vesicular with a karyosome. The refringent granules stain like chromatin, and are thought to be " of the nature of reserve chromatin, or volutin." The spaces around the parasites when enclosed in host cells are indicative of a destructive liquefying action of the parasite on the protoplasm of the host cell.

Multiplication by longitudinal division is described, and multiple division (schizogony) was seen.

Attempts at cultivation gave negative results.

The author confirms the statements of Nicolle and Conor that Toxoplasma causes a seasonal disease in the gondi. The paper is illustrated by a plate of 25 figures.

H. B. F.

Carini (A.) & Maciel (J.). **Toxoplasmose naturelle du Chien.**—*Bull. Soc. Path. Exot.* 1913. Dec. Vol. 6. No. 10. pp. 681–683.

In the first part of the paper the authors state that they have now come to the conclusion that the Toxoplasma of European and American dogs is identical. They then proceed to record their recent researches at Sao Paulo, Brazil.

Two young dogs, infected naturally with toxoplasma, showed post mortem a clear serous exudate in the abdominal and thoracic cavities. The lungs were pneumonic, the liver and kidneys very hyperaemic. Toxoplasma were especially numerous in the lungs. An emulsion of the organs of each of these dogs injected into other young dogs and pigeons reproduced the disease. Young dogs contracted a severe infection that killed them in eight to twelve days. Adult dogs were more resistant, even though larger quantities of virus were employed. The inoculated pigeons died in twelve to nineteen days, as if they had been infected with *T. cuniculi*. The pigeons showed

a rather marked oedema of the eyelids and cloaca, with numerous toxoplasms occurring in the oedematous tissues.

In dogs and pigeons dead of toxoplasmosis, whether acquired naturally or artificially, neither morphologically nor pathogenically was it possible to differentiate between *Toxoplasma canis*, *T. cuniculi* and *T. columbae*, which makes it very doubtful whether they should be considered as distinct species. The authors conclude that one toxoplasm only produces the natural infection of dogs, rabbits and pigeons.

H. B. F.

Fantham (H. B.) & Porter (Annie). **The Pathogenicity of *Nosema apis* to Insects other than Hive Bees.**—*Annals Trop. Med. & Parasit.* 1913. Dec. 30. Vol. 7. No. 4. pp. 569–579.

The paper contains an account of the pathogenic effects of *Nosema apis*, the parasite of "Isle of Wight" disease in bees, on various Hymenoptera, Lepidoptera and Diptera. Many of the experiments were suggested or based on natural infections observed in the open. *Nosema apis* produced great effects in most of the insects used.

The authors' summary and conclusions are as follows :—

"11.—*Nosema apis* has been proved pathogenic to Hymenoptera other than bees. It can multiply in the food canals of humble bees, mason bees and wasps, and can bring about the deaths of the hosts.

"12.—Contamination of plants with infected excrement occurs in the neighbourhood of badly infected hives. Such contaminated food is pathogenic to the larvae of cabbage white butterflies, cinnabar moths, and gooseberry moths, in which *Nosema apis* produces destruction of the tissue of the food canal in the same way as in bees. Both imagines and larvae of these insects became infected with microsporidiosis when supplied with food contaminated with Nosema spores.

"13.—*Calliphora erythrocephala*. The blow fly becomes infected naturally by ingesting Nosema spores contained in the sweet excrement of bees. This infection has been repeated experimentally. Crane flies may also become infected.

"14.—A member of the Hippoboscidae, *Melophagus ovinus*, has been infected successfully with *Nosema apis*, which is pathogenic to the sheep ked. It is suggested that research be made by competent observers among the Glossinae for Microsporidian parasites allied to the Nosema of bees, and, possibly, equally pathogenic to the tsetse flies that may harbour them."

[The morphology, life-cycle, modes of infection and pathogenicity of *Nosema apis* in bees were summarised in this *Bulletin*, Vol. 1, pp. 156–157.]

W. Y.

Miyaji (S.). **Zur Frage nach der Natur der Kurloffschen Körperchen.** [On the Nature of the Kurloff Bodies.]—*Centralbl. f. Bakt.* 1. Abt., 1. Orig. 1913. Oct. 4. Vol. 71. Nos. 2/3. pp. 189–198. With 2 coloured plates.

The author reviews critically the results of the work of previous investigators on Kurloff bodies and experimentally tests their results. Miyaji examined 151 guinea-pigs, of which 57 were adult males, 66 adult females (of which 13 were pregnant), 10 young males and 18 young females. Twenty-six embryos were also examined. Kurloff bodies occurred in 48 females and 25 males. Gravid and puerperal guinea-pigs always contained them. Young animals and embryos did not contain them, and they were rarely obtained from placentae.

Many stains were used on dry and wet fixed films, and "jelly" methods of investigation were employed. The result was to show that the constitution of the "nuclear" apparatus of a Kurloff body varied both in extent and composition according to the stain employed. No spirochaetes were observed within the Kurloff bodies when investigated by dark ground illumination. Spleen emulsion and blood from freshly dead gravid guinea-pigs, containing numerous Kurloff bodies, were used for inoculation, but two months' observation has so far given negative results.

Miyaji does not regard the Kurloff bodies as parasites. He has very seldom found structures which could be considered as intracorpuscular or free spirochaetes. Microscopic appearances after vital staining show structures more or less like the initial bodies, elementary bodies, etc. of Chlamydozoan enclosures, resembling them in their variability of colouring, the lack of knowledge of their transmissibility and the negative statements regarding the body contents in natural situations with vital colouring. The Kurloff bodies appear to be vacuole-like structures in leucocytes, which are capable of spontaneous development at certain periods in the sexual life of the host.

H. B. F.

i. Pappenheim (A.). **Ueber neure Feststellungen zur Natur der sog. Kurloffkörper in den grossen Lymphozyten des Meerschweinchen-blutes.**—*Folia Haematologica.* 1913. Dec. Vol. 17. No. 2. pp. 183–190.

ii. Schulhof (Kamil). **Studien über die Kurloffkörper nebst Beiträgen zur vergleichenden Hämatologie.**—*Folia Haematologica.* 1913. Dec. Vol. 17. No. 2. pp. 191–210.

i. Pappenheim reviews first the many suggestions made as to the nature of the Kurloff bodies in guinea-pigs. Two main views are discussed:—(*a*) That the Kurloff bodies are either parasites or plasmatic-plastinoid reaction products due to an invisible virus or hormone. (*b*) That they are mere autogenous, fluid, cell secretions. The present paper deals mostly with the morphological aspect of the bodies under various conditions. They are structureless and homogeneous in unstained preparations. In fixed and stained preparations their structure varies according to the reagents used. The author considers that the Kurloff bodies are of the nature of a secretion, and he mentions their transmutation into and analogy with azur grains. The bodies occur only in the genus *Cavia*.

ii. Schulhof concludes that the Kurloff bodies are physiological structures and not of a pathological nature. He does not believe that they are Chlamydozoa. There is no evidence of a preformed structure; they are homogeneous. The author concludes with a summary of the various peculiar granulations observed in the blood elements of many animals that he has examined.

H. B. F.

KALA AZAR.

Laveran (A.). i. **Kala Azar Méditerranéen et Kala Azar Indien.**—*Bull. Soc. Path. Exot.* 1913. Oct. Vol. 6. No. 8. pp. 574–579.

ii. **Les Macaques et les Chiens sont Sensibles au Kala Azar Indien comme au Kala Azar Méditerranéen.** — *Compt. Rend. Acad. Sciences.* 1913. Nov. 17. Vol. 157. No. 20. pp. 898–901.

i. This paper is mostly a resumé of the author's (and C. Nicolle's) address before the International Congress of Medicine. Here again the author insists that the differences which were supposed to exist between the Indian and Mediterranean kala azar have gradually been disproved. He enumerates the successful inoculations which have been made with the virus of Indian kala azar. Row has produced a local lesion in three *Macacus sinicus*, a general infection in a fourth monkey of the same species, and a general infection in two white mice; Donovan has successfully inoculated a young dog, while Patton has infected four *Macacus sinicus*, four dogs, one jackal and one white rat, and Mackie one white mouse, one *Macacus rhesus* and two flying squirrels (*Galeopithecus volans*).

ii. Cultures of *Leishmania donovani* were obtained from Dr. Row in Bombay, and were maintained at the Pasteur Institute, Paris on NNN medium. Two *Macacus sinicus* were inoculated intrahepatically with the cultures. One of these was again inoculated 50 days later. It died three months after the first inoculation. Very scanty leishmania were found in the smears of the spleen and marrow, and from this a culture was obtained. The second of the monkeys received a second injection 70 days after the first, and a third injection 42 days later. The monkey died five months from the date of the first injection. There was a heavy infection of the liver, spleen, and bone marrow.

Nine young dogs were inoculated either intrahepatically or intravenously with cultures. Of these only three contracted infection, mild in each case. The results obtained by the author with the Indian virus are similar to those obtained with the virus of Mediterranean kala azar, so that he believes it is no longer possible to doubt the identity of the two diseases.

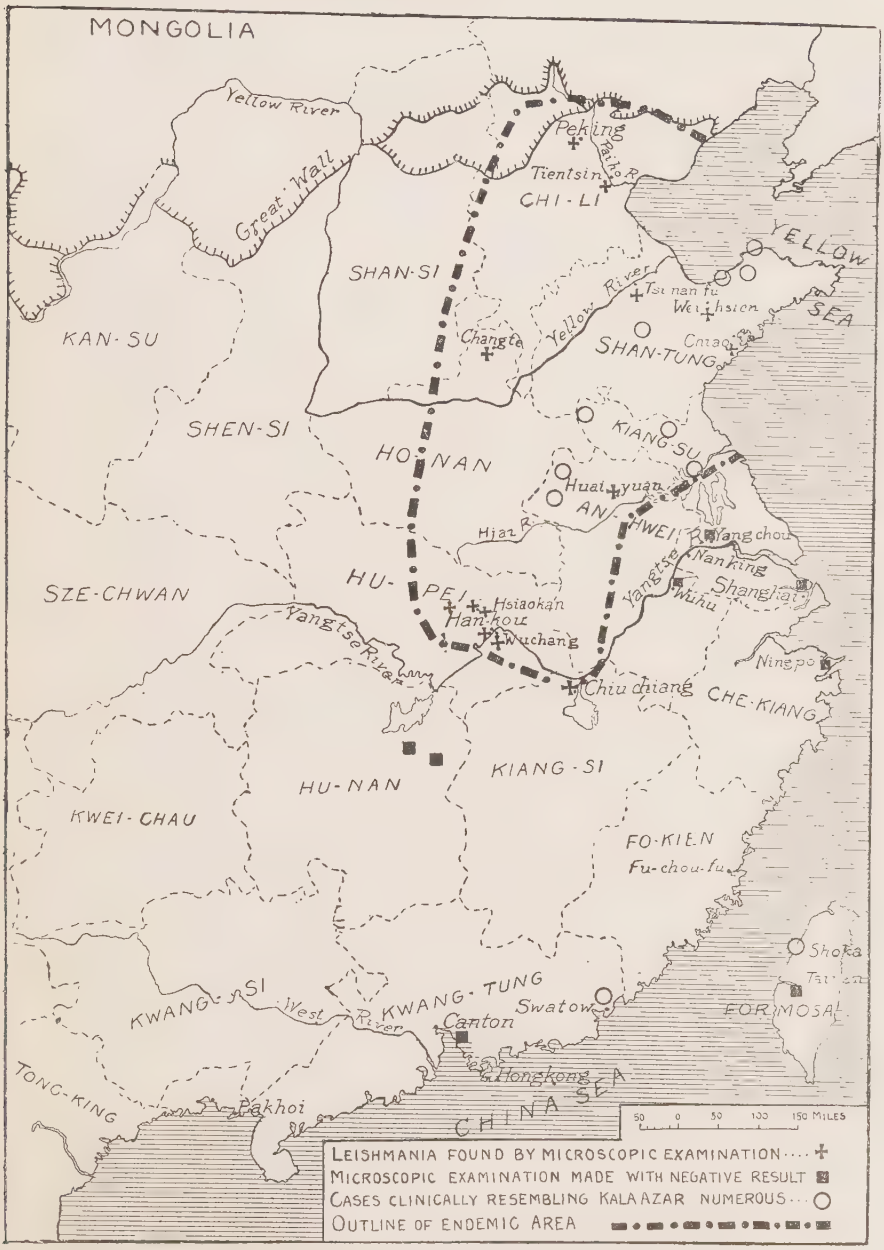
C. M. Wenyon.

Cochran (S.). **The Superficial Lymph Nodes as a Source of Leishmania for the Diagnosis of Kala Azar: with some Observations on Kala Azar in China.**—*Jl. London School Trop. Med.* 1913. Nov. Vol. 2. Pt. 3. pp. 179–195. With 1 map and 1 fig.

The author has endeavoured by means of a circular letter to obtain information on the distribution of kala azar in China. He finds that all reports of the finding of leishmania come from places north of the Yangtze River, with the exception of Wuchang and Kiukiang, which are on that river. All the negative examinations were made in places south of the river, with the exception of Yangchou, which is a few

miles north of the river. The information collected is illustrated by a map, which is here reproduced in part.

Writing of kala azar in his own district of Hwaiyan, the author



Map showing distribution of Kala Azar in China.

states that undoubtedly the great majority of cases of splenomegaly seen are cases of kala azar. In the two years, June 1st, 1910 to June 1st, 1912, of 8,058 patients seen in out-patient practice 83 are

recorded as kala azar or splenomegaly. As regards the age of these patients the following table is given :—

		Per cent.
1–10 years	27	32·6
10–20 „	24	29
21–30 „	18	21·6
31–40 „	11	13·2
41–50 „	3	3·6
	83	100

The oldest patient was 50 years, and the youngest two years. A positive diagnosis by the finding of leishmania was made in 20, and in 16 of these the average age was 16·8 years, the youngest being four years old and the oldest 35. In other parts of China where the parasite has been found, the result has been as follows :—

Hankow.—Aird and Thomson's cases were adults.

Ksiaokan.—One patient of 22 and one of 57.

Weihsien.—Mostly children, though adult cases not uncommon.

Tsinan.—Children and adults.

Changte, Honan.—Leslie's cases were all children.

Pekin.—Aspland's cases were all children.

The author writes that it is evident the disease is not kala azar infantum, and thinks that there is hardly sufficient evidence to warrant dividing the disease anywhere into two separate entities.

As regards the sex of the 83 cases only four were females, but this is due in some degree at least to the fact that males mostly apply for treatment. The average duration in 28 cases was 12·8 months, the shortest being four months, and the longest five- six years. Only one fatal case had lasted over twelve months. There is a tendency for the disease to spread amongst members of one family. The symptoms of disease as it exists in China do not differ from those elsewhere. It is reported that in every case examined the inguinal glands have been more or less enlarged. As regards other glands there has been much variation.

The various methods of diagnosis are discussed in detail, and the author again advocates the excision of a superficial lymphatic gland for this purpose. This is done under local anaesthesia, and the removed gland is cut into two pieces and smears made directly from the cut surface. Puncture of the gland without excision has not given such good results.

In the table are set forth the gland examinations made in 20 cases, and the time which was required to establish a diagnosis by examination of the stained films.

Case.	Source.	Time of Search. Smears.		Puncture.
I.	Post-cervical	Every field	——	Negative
II.	Post-cervical	5 min.	——	Not successful. No fluid drawn
III.	——	25 ,,	——	Not attempted
IV.	——	5 ,,	——	,, ,,
V.	——	5 ,,	Very abundant	,, ,,
VI.	Post-cervical	2 ,,	——	,, ,,
VII.	Post-cervical	2 ,,	——	Positive, 10 min.
VIII.	——	½ ,,	——	Negative
IX.	Inguinal	20 ,,	——	,,
X.	Inguinal	4 ,,	Scanty	Not attempted
XI.	Inguinal	8 ,,	Scanty	Positive, 12 min.
XII.	Inguinal	2 hrs.*	Negative	Positive, 40 min.
XIII.	Inguinal	3 min.	——	Puncture unsatisfactory.
XIV.	Inguinal	3 ,,	——	Not made
XV.	Inguinal	3 hrs.	Negative	,, ,, †
XVI.	Inguinal	135 min.	——	Unsatisfactory
XVII.	Inguinal	2 hrs.	One degenerating parasite	Positive, 40 min. Typical parasite
XVIII.	Inguinal	65 min.	——	Negative. One hour search.
XIX.	Inguinal	12 ,,	——	Not made
XX.	Inguinal	1 ,,	——	Negative. ½-hour search

As regards prognosis and treatment little can be said, as the patients are rarely willing to remain in hospital for any length of time.

C. M. W.

Bassett-Smith (P. W.). **Kala Azar in an Adult from Malta.**—*Jl. R. Army Med. Corps.* 1913. Nov. 1. Vol. 21. No. 5. pp. 581–582. With 1 text fig.

The case described is one of a man aged 29 in the Royal Navy who, without doubt, contracted the disease while stationed on shore in Malta. Spleen puncture had been performed once by Surgeon A. V. N. Richardson, R.N., who first discovered leishmania in the case, and liver puncture four times by the author who discovered parasites on each occasion, though at the last puncture they were very scarce. Cultures have been obtained on NNN medium.

C. M. W.

Lo Re (Mariano) & de Stefano (Silvio). **Sopra Otto Casi di Anemia da Leishmania.**—*Gaz. Internaz. d. Med. Chirurg. Igiene.* 1913. Dec. 6. No. 49. pp. 1157–1161.

An account of eight cases of infantile kala azar, seen in the clinic at the University of Naples. The ages of the children varied from 13

* This case showed parasites in a gland-smear some weeks later.

† Further examination would have been made in this case but for his refusing to stay in the hospital.

months to six years, and they came from the following localities: (1) S. Lucido, in the province of Cosenza; (2) Capaccio in Salerno; (3) Piazzolla di Nola in Caserta; and the remaining five from villages round Vesuvius.

C. M. W.

Spolverini (L. M.). **Contributo allo Studio della Leishmaniosi infantum.**—*Pediatria.* 1 13. Sept. 30. Vol. 21. No. 9. pp. 659–668.

A description of two cases of infantile kala azar, one from Roccasecca (Caserta), and the other from Algeria, seen by the author in Rome.

C. M. W.

Di Cristina (G.) & Caronia (G.). **Serologische Untersuchungen bei der infantilen Leishmaniosis.**—*Zeitschr. f. Kinderheilk.* Orig. 1913. Nov. 15. Vol. 9. No. 2. pp. 128–146. **Ricerche Serologiche nella Leishmaniosi infantile.**—*Pediatria.* 1913. Nov. 30. Vol. 21. No. 11. pp. 801–817.

Caronia (G.). **Agglutinine e Precipitine Specifiche nella Leishmaniosi Infantile.**—*Pediatria.* 1913. Sept. 30. Vol. 21. No. 9. pp. 641-644. **Spezifische Agglutinine und Präzipitine bei der infantilen Leishmaniosis.**—*Zeitschr f. Immunitätsforsch. u. Experiment. Therapie.* 1. Teil. Orig. 1913. Nov. 24. Vol. 20. Nos. 1/2. pp. 174–177.

These papers have to do with serological researches into infantile kala azar, and are chiefly written with a view to collecting the results obtained by the authors at the University of Palermo.

1. *Serological researches bearing on epidemiology.*

The relation of canine to infantile kala azar is discussed, and the following experiment described. A healthy child and one suffering from infantile kala azar were rendered immune to killed cultures of human leishmania, and likewise a healthy child and one with kala azar were made immune to killed cultures of canine leishmania. The serums of these four children were tested for deviation of the complement and agglutination with a definitely positive reaction in each case, confirming the results previously obtained by Baudi, who worked with rabbits, that from this point of view the canine and infantile leishmania are identical.

Investigations were undertaken with the flagellates found in fleas taken off kala azar dogs. An alcoholic extract of 200 of these fleas was made and used as antigen in testing for deviation of the complement. The result obtained did not support in any way the view that the flea flagellates are connected with the leishmania of the dog.

2. *Serological researches bearing on pathogenesis and diagnosis.*

(*a*) *Agglutination and agglutino-precipitation.*

As a result of their own observations and those of other observers, the authors conclude that agglutinins and specific precipitins only rarely are produced in any quantity in the blood as the result of the natural leishmania infection, but that it is possible to produce them artificially by the injection of killed parasites or of nucleo-proteids extracted from these.

(*b*). *Specific amboceptors.*

The reaction for deviation of the complement has been tried in 88 cases of infantile kala azar, with a partially or definitely positive result in 13 cases. The authors conclude therefore, that the leishmania act like other microorganisms, in that they stimulate the body by means of toxins and endotoxins to the production of antibodies. In the cases in which a positive result was obtained, the malady had only been of short duration, suggesting that there is an immunity reaction early in the disease only. In one case this disappeared after fifteen days.

(*c*). *The strength of complement.*

There is a constant increase in the power of the complement towards the later stages of the disease (see this *Bulletin*, Vol. 2, p. 438).

(*d*). *Allergic sero-diagnosis.*

This is a reaction that has been suggested by Ascolti. It depends upon the fact that a subject who has been submitted to the action of an antigen without having reacted in the production of specific antibodies, may be artificially stimulated with small doses of the same antigen (killed cultures, toxins, &c.), so that he acquires the power of forming these antibodies, and they are produced in him more quickly than in a subject who has not previously been submitted to the action of the antigen. Ascolti has found this reaction to apply to certain cases of undulant fever which have failed to produce antibodies as a result of natural infection. In the case of kala azar, two patients were taken in whose blood no antibodies could be detected. These, with two healthy children, were treated with nucleo-proteids extracted from cultures of leishmania. In all four the reactions for deviation of the complement and agglutination appeared on the fifth or sixth day, so that there was practically no difference noted between the infected and healthy children.

(*e*). *Skin-reaction.*

In only one case was any skin reaction noted at the site of inoculation of cultures killed at 55°C.

(*f*). *Anaphylaxis.*

The most satisfactory test is carried out in the following manner: 2-3 c.c. of serum from a case of kala azar is mixed with 2 c.c. of culture of leishmania from NNN medium, and after having been kept at 37° C. one hour, and on ice for 24 hours, the mixture is injected intravenously into a guinea-pig which has been immunized against culture of leishmania by repeated subcutaneous injections. In eight cases of kala azar tested in this way a mild reaction was obtained in two, a more definite one in two, and a very decided one in the remaining four. With four healthy children tested as controls, the reaction was invariably negative. In the guinea pigs the reaction may be so marked as to bring about the death of the animal. [The author's original paper on this subject was reviewed in Vol. 2, p. 437 of this *Bulletin*.]

3. *Serological researches bearing on treatment.*

An earlier paper by the authors on this subject was reviewed in this *Bulletin*, Vol. 1, p. 7. No very satisfactory results have been obtained by the injection of killed cultures. Recently attempts have been made to treat cases by the injection of nucleo-proteids, extracted from cultures by the method of Lustig and Galeotti. In some

there appeared to have been a degree of improvement, but recognising the fluctuations to which this disease is liable the authors hesitate to pronounce any definite opinion.

C. M. W.

Mayer (Martin) & Werner (Heinrich). **Kultur des Kala-Azar-Erregers (*Leishmania donovani*) aus dem peripherischen Blut des Menschen.** [Cultivation of *L. donovani* from the Peripheral Blood of Man.]—*Deut. Med. Wochenschr.* 1914. Jan. 8. Vol. 40. No. 2. pp. 67–68.

One dozen tubes of NNN medium were inoculated with three to five drops each of peripheral blood from a case of Indian kala azar, in the Institute for Tropical Diseases in Hamburg. The tubes were examined every week, and on the 29th day the eight tubes remaining uncontaminated were all found to have a growth of flagellates which were numerous in three tubes, but more scanty in the others. This is the first time that culture from the peripheral blood of man has been successful. Novy had previously succeeded in obtaining culture from the peripheral blood of an infected dog. The authors advocate the culture test as an aid to diagnosis.

C. M. W.

Gray (A. C. H.). **Report on some Observations made and Work done at the Pasteur Institute, Tunis.**—*Jl. R. Army Med. Corps.* 1913. Dec. Vol. 21. No. 6. pp. 696–712. With 9 figs.

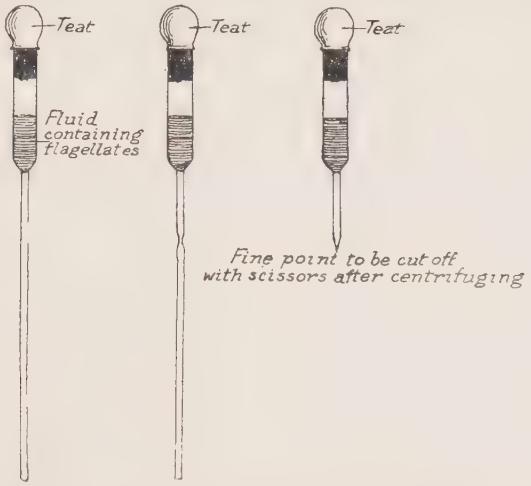
This report is mainly an account of the work which is being carried on at the Pasteur Institute in Tunis. Amongst other matter, there is mention of some observations made by the author on leishmaniasis. A description is given of Nicolle's method of preparation of NNN medium for the culture of flagellates. The blood for this medium is obtained by plunging the needle of the syringe into the rabbit's thorax, through the third left intercostal space at a point near the sternum, after sterilising the skin with strong iodine solution. The blood is transferred directly without defibrination to the still liquid agar in the test tubes.

An account is given of the examination of dogs for natural leishmania infections (see this *Bulletin*, Vol. 1, pp. 637-638).

A method for obtaining stained preparations of cultural forms of flagellates is given. It is described in the following words :

" An ordinary pipette is taken and sterilised in the flame. When cool, a little of the fluid at the bottom of the culture tube containing the flagellates is sucked up into the pipette, and then about three times the bulk of physiological salt solution. The culture and solution are drawn up into the wide part of the pipette and mixed. The tube is then sealed off high up close to the wide part, the sealed end being drawn into a fine point as shown. The teat is removed and the tube containing the diluted culture is centrifuged slowly for two minutes. Great care must be taken to protect the fine drawn-out bottom of the tube from breakage during the centrifuging. Practically all the cultural forms are now in the fine drawn-out point of the tube. The very tip of the tube is cut off with scissors and the drop of fluid which emerges, and which contains the parasites, is placed at one end of a clean slide. A drop of quite fresh human serum, of equal bulk, is now placed beside it ; the two drops are thoroughly and rapidly

mixed and filmed out with a spreader. The film is fixed in absolute alcohol for the regulation fifteen minutes. I generally stained my films with Giemsa's stain, using a mixture of 1½ drops of the stain to every cubic centimetre of distilled water, and staining for twelve minutes only. The



action of the fresh serum on the washed flagellates causes them to take up the stain very quickly, and I found the above time ample. The films are then washed and blotted in the ordinary way."

C. M. W.

Cannata (S.). **Le Piastrine del Sangue nella Leishmaniosi Infantile.** [Blood Platelets in Infantile Leishmaniasis.]—*Pediatria.* 1913. Sept. 30. Vol. 21. No. 9. pp. 645–648.

This is an account of investigations into the number of blood platelets present in the blood of cases of infantile kala azar. In counting the platelets Helber's chamber was used. The blood was taken into a Thoma-Zeiss apparatus up to the 0.5 mark, and diluted with Deetjen's liquid, which consists of metaphosphate of soda grams 2, chloride of sodium grams 0·9, and distilled water 100 c.c. Objective 1/7 with ocular 8 was employed. In two healthy children the blood platelets numbered 275,000 and 260,000 per cmm. of blood. In 14 cases of kala azar the number varied between 187,500 and 93,740, with the exception of one of the cases in which it was as high as 327,840. In this case the examination was made early on in the disease when the general condition was very good. The lowest figure was obtained in the case of a child in a very serious condition of advanced disease.

C. M. W.

Statham (J. C. B.) & Butler (G. G.). **Note on Certain Bodies found by Liver Puncture in a Case of Fever associated with Splenic Enlargement.**—*Jl. R. Army Med. Corps.* 1913. Dec. Vol. 21. No. 6. pp. 629–635. With 1 plate.

Smallman (A. B.). **Note on Some Cellular Bodies found in a Case of Mediterranean Leishmaniasis.**—*Ibid.* pp. 636–640. With 1 plate.

The former of these two papers contains a description of certain

bodies which were seen in films made from liver puncture material from a child aged eight years, with enlarged spleen, in Freetown, West Africa. The bodies in question consist of protoplasmic masses of various sizes (3-20μ) containing chromatin staining granules, some having a diameter of 1-2μ. These bodies resemble structures described by ARCHIBALD and obtained by him from the liver of a case of Sudan kala azar. As to their nature, the authors hesitate to pronounce any definite opinion, but bring forward the suggestion that they may be schizonts of some protozoon, and may possibly have a similar relation to *Leishmania infantum* that ARCHIBALD's bodies appear to have to *L. donovani*. No leishmania, however, could be found in the case. [It is stated that ARCHIBALD showed that his bodies were convertible into Leishman-Donovan bodies when injected into a monkey. This statement is hardly accurate. ARCHIBALD could find no leishmania in his case, but the liver puncture material injected into a monkey produced infection with leishmania. This infection may just as well have been produced by leishmania, which were too few in number to be detected microscopically, as by the granules which were so numerous.]

The second paper contains an account of similar bodies which were obtained from the liver of a case of Mediterranean kala azar, in a child aged two years from Malta. These bodies are again very similar to those found by ARCHIBALD in his Sudan case. In this case there had been considerable improvement in the general health, and no leishmania were found in the eight smears from liver puncture material, so that the author inclines towards the view that some stage in the development of the leishmania is represented.

Each paper is illustrated by a coloured plate which shows very well the character of the bodies in question.

C. M. W.

CANINE KALA AZAR.

LEMAIRE (G.), SERGENT (E.) & LHÉRITIER (A.). **Recherches sur la Leishmaniose du Chien d'Alger.**—*Bull. Soc. Path. Exot.* 1913. Oct. Vol. 6. No. 8. pp. 579-581.

The authors have continued the examination of dogs in Algiers for natural leishmania infection. During the four months, August to November, 1912, there were examined 207 dogs. In each case four films from the spleen and bone marrow were searched for parasites, but only two dogs were found infected. Further examinations were made in 1913, during the four months, April to July. During this period, in addition to examination of smears, the bone marrow of each dog was inoculated into NNN medium. Of 279 dogs seven were found infected. In two of these cases the first examination of the smears had given a negative result, whereas the culture on NNN medium was positive. A further search through these films showed two infected cells in the bone marrow of one animal, but in the other no parasites were found. The authors insist, therefore, on the culture method as being more reliable than simple microscopic examination of smears of the organs. They further call attention to the necessity of perfectly fresh NNN medium, when used for culture in this manner. During the examination it was noted that some of the

dogs had lesions of the skin, eyes and mucous membranes, and that these animals became profoundly cachectic, and died after a long illness, while others had no such lesions but were simply emaciated, while their organs contained enormous numbers of leishmania. The authors agree with BASILE that in the dog two types of disease may occur—one a chronic form of long duration, and the other acute and of short duration.

C. M. W.

JAUNOT (A.). **Infection de la Souris avec le Virus de la Leishmaniose canine naturelle.**—*Bull. Soc. Path. Exot.* 1913. Dec. Vol. 6. No. 10. pp. 683–685.

Two mice were inoculated intraperitoneally from the bone marrow of dogs found to be naturally infected with leishmania in Tunis. One was killed after two weeks, and was found to have a large spleen. Leishmania were found in smears of the liver and peritoneal exudate, but not in smears of the spleen, though culture from this on NNN medium was positive. Three mice and a number of other small animals were inoculated from the liver of this mouse. 24 days later one mouse was killed and parasites found in the peritoneal exudate alone. Culture from the spleen, however, was again positive. None of the other animals became infected. The second of the two mice originally inoculated was also found to be infected when killed on the 28th day. Parasites were numerous in the peritoneal exudate, but were not found in the spleen, which gave again a positive culture. Other animals inoculated from this one did not become infected.

C. M. W.

VISENTINI (Arrigio). **Ricerche Morfolgiche, Culturali, e Biologiche sulla Leishmania della Leishmaniose spontanea del Cane.**—*Rendiconti d. R. Accademia dei Lincei.* 1913. Dec. 7. Vol. 22. Ser. 5. 2 sem. No. 11. pp. 582–587.

La Mie Ricerche di Trasmissione delle Leishmaniosi. [Lettere all'Editore.]—*Pathologica.* 1913. Dec. 1. Vol. 5. No. 122. p. 734.

The author has been working with cultures of leishmania obtained from a naturally infected dog. Structurally, the flagellates do not differ in any way from those seen in cultures obtained from the human virus, and described by the author in an earlier paper (see this *Bulletin*, Vol. 1, p. 360).

The cultures of both the canine and human leishmania in NNN medium will develop and live in ROW's medium (*Kala Azar Bulletin*, No. 3, p. 149).

With the culture of the canine virus the author injected intravenously three rabbits, none of which became infected. The same was injected into the jugular veins of two adult dogs. The dogs were killed two and three months later, and leishmania were found in the bone marrow alone of one of these dogs. Two puppies were injected with the canine cultures intraperitoneally. One died on the 104th day, and the other was killed on the 130th day. Both were infected in the spleen and bone marrow. Two other puppies were injected

with culture, intravenously. One died on the 68th day and leishmania were found in the spleen. The other was killed on the 109th day, and no leishmania were found.

The author points out that these results strengthen the belief in the identity of the human and canine leishmania of the Mediterranean districts.

C. M. W.

Tropical Sore.

Brumpt (E.) & Pedroso (A.). **Recherches Epidémiologiques sur la Leishmaniose forestière Americaine dans l'Etat de Sâo-Paulo (Brésil).**—*Bull. Soc. Path. Exot.* 1913. Dec. Vol. 6. No. 10. pp. 752–762.

For the disease discussed in this paper the authors propose the name American forest leishmaniasis. It has long been known under various other names, viz., Pian-bois, Forest yaws, Bosch yaws, Bouton de Bahia, Ferida brava, Ulcère d'Avanhandava, Bouba brasiliana, Ulcère de Bauru, Ulcère du Nordoest, Espundia, Ulcère de Torrealba, etc. Clinically, the majority of cases are benign and resemble Oriental sore of the Eastern hemisphere, but about 10 per cent. are malignant, and run on to a much more serious condition. In discussing the etiology of the disease, which is the subject with which the paper chiefly deals, the authors point out that two features are perfectly clear: (i) that the disease is contracted in the forest regions where recent clearing has been undertaken; and (ii) that the ulcers occur on uncovered parts of the body, and are more frequent at certain seasons of the year.

In a case seen by Darling in Panama the patient blamed a Tabanid fly. At Manaos, on the Amazon, A. de Matta accused the tick, *Dermacentor variabilis* (=*D. electus*); in Paraguay Migone likewise regarded ticks as the likely transmitters as also did Flu in Surinam.

The authors, having spent about three weeks in the infested forest regions, met with 65 cases of the disease, and were able to study the various local conditions, and the biting arthropoda which were likely to transmit the malady. Terrestrial leeches (*Haemadipsa*) were not known in the district. As regards Acarines, the authors give a long list of the American Ixodidae which may attack man. In the forest regions the most common of these is *Amblyomma cayennense*. The distribution of the wounds inflicted by the larvae of this tick on the forearms and legs corresponds with that of the ulcers due to leishmania, so that one might be led to suspect this animal, were it not that dogs, which the authors have shown to be liable to the disease as well as man, are not attacked by this particular tick. Further, the fact that the lesions are often multiple indicates that the transmitter is probably some creature which returns to feed persistently when driven away. As regards hemipterous insects, there is no correspondence in their distribution with that of the disease, which is, as already stated, contracted in the virgin forest. Of dipterous insects, the authors mention several which have to be considered. *Lipoptena*(?), Fleas, Tabanidae, *Stomoxys*, Nematocera, Simuliidae, *Ceratopogon*, *Phlebotomus*, Culicidae. Of all these the only insects which in their distribution and habits would fulfil necessary conditions are the Tabanidae. These are met with especially in the forest regions; as a rule they do

not travel far from the locality in which they are hatched, and in their attacks on man they are very persistent, returning to inflict wounds again and again when driven off. This repeated attack seems to the authors very suspicious, and explains how an individual may receive numerous inoculations from one infected fly.

An attempt was made to discover a natural reservoir for the virus in the wild game of the forest, but without success. Of the dogs which accompany the labourers into the forest five were found to have the disease, and in three of these the ulcer was on the nose. The natural disease in dogs appears to have been described previously by A. Pedrosa.

During the present year the authors hope to conduct experiments to test the Tabanid theory of transmission.

C. M. W.

Boletim da Sociedade Brasileira de Dermatologia. –1913. Anno 2. No. 1. pp. 17 & 28. [French resumé pp. 34, 40–41.]

Two cases of leishmaniasis of the mouth and pharynx were exhibited to the Society. The first case was shown by Werneck Machado, and was of a woman aged 60 years. The Wassermann reaction in this case was positive, and no leishmania were found. In spite of this a diagnosis of leishmaniasis was made, and the patient treated with injections of tartar emetic with a complete cure as the result. The second case was shown by G. Vianna to illustrate the good effects of intravenous injections of tartar emetic in this disease, which is very common in the northern parts of Brazil. Ed. Rabello presented a note on the distribution of leishmaniasis in Brazil, and reported cases from Rio de Janeiro and Bahia.

C. M. W.

Padesca (Adelino). **Nota sobre um Caso de Leishmaniase Cutaneo-Mucosa, proveniente do Brasil.**—*Arquivos de Higiene e Patologia Exoticas.* 1913. Oct. 31. Vol. 4. pp. 51–62. With 5 plates.

This paper gives a detailed description of a case of dermal leishmaniasis complicated with lesions of the mucous membranes of the nose and mouth. The patient was 30 years of age, and had come from the Upper Amazon. There were multiple ulcers on the limbs and body, extensive ulceration of the chin, and involvement of the mouth and nose with destruction of the nasal cartilages.

C. M. W.

Minett (E. P.) & Field (F. E.). **Notes on a Case of Dermal Leishmaniasis in British Guinea** [Guiana.]—*Jl. Trop. Med. & Hyg.* 1913, Nov. 15. Vol. 16. No. 22. pp. 249–350.

The case referred to was that of a native of Barbados, aged 47, who had numerous papules and ulcers about the arms, legs and face, with two on the glans penis. Large numbers of leishmania were found in the lesions. The patient had worked chiefly at wood-cutting, and the case appears to be one of forest yaws.

Treatment with mercury, potassium iodide, injections of salvarsan, and neosalvarsan with external applications has so far produced no

improvement. [In the title of this paper Guiana should have been inserted in the place of Guinea (see this *Bulletin*, Vol. 2. p. 453).]

C. M. W.

Strong (Richard P.), Tyzzer (E. E.), Brues (Charles T.), Sellards (A. W.) & Gastiaburu (J. C.). **Verruga Peruviana, Oroya Fever and Uta.**—*Jl. Amer. Med. Assoc.* 1913. Nov. 8. Vol. 61. No. 19. pp. 1713–1716.

Uta is a disease which has existed in Peru since prehistoric times, and has been supposed to be a form of syphilis, leprosy or lupus vulgaris. In Surco and Otao a large proportion of the inhabitants are either afflicted with the disease or show the disfiguring scars, which have resulted from a previous attack, on the face, arms or legs. The authors have discovered leishmania in the lesions; they have obtained the flagellate stage and have successfully inoculated animals from a human case.

C. M. W.

Velez. **Uta et Espundia.**—*Bull. Soc. Path. Exot.* 1913. Oct. Vol. 6. No. 8. p. 545.

At the meeting of the *Société de Pathologie Exotique*, held October 8th, 1913, the President, M. Laveran, announced that he had received a letter from Dr. Velez, dated Trujillo (Peru), July 25th, 1913, informing him that he had discovered leishmania in the disease known as Uta. The writer of the letter with somewhat undue haste wishes to create for the parasite the name *Leishmania peruviana*, owing to certain differences which he imagines to exist between it and other forms of leishmania. Laveran justly remarks that this is a difficult question which will require investigation, but that in all probability the disease Uta will be found identical with the Espundia of other parts of South America.

C. M. W.

Wagon (P.). **Un Cas de Leishmaniose cutanée traité avec Succès par l'Arsénobenzol (Billon).**—*Bull. Soc. Path. Exot.* 1913. Nov. Vol. 6. No. 9. pp. 624–625.

The case described is that of a Frenchman who came to Niamey (on the Niger), in November 1912. During his stay there up to May 1913, he suffered from numerous attacks of fever and came for treatment for malaria to Cotonou in June 1913. It was noted he had various skin lesions about the legs and arms. These had recently appeared. The largest was an ulcer 2–3 centimeters in diameter. Most of them were crusted over and purulent. Examination of smears from these lesions showed typical leishmania.

By way of treatment an intravenous injection of 0·30 gram of salvarsan was given. There was considerable reaction, with elevation of temperature (38° C.) and vomiting. After treatment the lesions commenced to heal, and within a fortnight the patient was discharged perfectly cured.

The author remarks that dermal leishmaniasis had previously been described by Stévenel from Nguigmi, near Lake Chad, and by Benoit-Gonin in the Agadès-Taoua district.

C. M. W.

Napier (A. H.). **A Note on Frontier Sores.** [Correspondence.]—*Indian Med. Gaz.* 1913. Oct. Vol. 48. No. 10. p. 413.

Writing of what is called Frontier Sore in the Derajat district, the author states that an examination of fifteen cases revealed leishmania in only one, so that it is a mistake to regard Frontier Sore and Oriental Sore as identical. The cause, the author claims, is a micrococcus, together with a stoutish bacillus.

C. M. W.

MALARIA.

Babington (W. H.). **Appendicitis simulated by Malaria.**—*Jl. R. Army Med. Corps.* 1914. Jan. Vol. 22. No. 1. pp. 82–83.

A record of two cases, one occurring in Malta, and the other at Scutari, in which the abdominal symptoms simulated appendicitis. In the first case the abdomen had been opened, but the appendix was found to be quite healthy; benign tertian parasites were found in the peripheral blood; the patient was completely cured by quinine.

In the second case, the tenderness over McBurney's point and the pain elicited by rectal examination suggested a localized inflammation of the appendix. Malaria parasites were numerous in the blood. All symptoms disappeared after an intramuscular injection of quinine.

P. H. Bahr.*

de Almeida (Theophilo) [Junior.] **Um Caso de Asthma palustre, observado numa Menina de Sete Annos.** [A Case of Malarial Asthma in a Girl of Seven.]—*Archivos Brasileiros de Med.* 1913. Sept. Vol. 3. No. 8. pp. 776–778.

The case of a girl in the Rio de Janeiro hospital, who presented symptoms of acute asthma. Emetics, belladonna plasters, blisters, fumigations, and doses of potassium iodide internally, failed to relieve the condition. Fever was marked, and malaria parasites were found in the blood. Euquinine, 80 centigrammes per diem, materially relieved the symptoms and apparently cured the patient.

Similar cases, and also relieved by quinine, have been reported by Matta, of Manaos.

P. H. B.

Dumolard, Aubry & Granger (M.). **De l'Aortite Paludéenne.**—*Rev. Méd. d'Alger.* 1913. Dec. pp. 1–25. With 2 plates.

The effect of chronic malaria infection on the vascular system was first suspected by Baumes in 1821, and subsequently by Maillot, Boudin, and Kalther. Quite recently, Pivassy has brought forward statistics in support of this view. The authors of the present paper made their observations at the hospital at Mustapha, a malarious spot, where cases of chronic aortitis and aortic dilatations were frequent. They believe these aortic degenerations are the result of chronic paludism. Malaria parasites [species not stated] were found only in a few instances.

[Before the author's conclusions can be accepted, a more extended study is certainly required.]

P. H. B.

Noland (Lloyd) & Watson (F. C.). **Spontaneous Rupture of the Malarial Spleen. A Report of Three Cases.**—*Proc. Canal Zone. Med. Assoc. for the Half-year, April to Sept.* 1912. Vol. 5. Pt. 1. pp. 108–114.

Traumatic rupture of enlarged malarial spleens is of common occurrence, but the authors consider a record of spontaneous rupture of the organ in three patients, in whom injury could be definitely excluded,

* Dr. P. H. Bahr is in charge of the Malaria and Blackwater Fever Sections during Dr. Balfour's absence abroad.

to be of great rarity and interest. Two were West Indian negroes, and one a Spaniard, labourers in the Canal Zone. All cases were operated on; one died, and two made a good recovery. The subtertian parasite was found in all, in the fatal case in smears of the spleen pulp post mortem. No note is made of the developmental stage of the parasite.

In two cases the symptoms resembled those of peritonitis, and a rupture of some viscus was suspected; in the third a tentative diagnosis of splenic abscess was made. In the fatal case, the onset of abdominal pain and consequently of the haemorrhage was sudden, and was not accompanied by a typical malarial attack, whereas the others had suffered from typical ague fits a few days previously. A moderate leucocytosis was present.

At each operation a moderate amount of free blood was found in the peritoneal cavity, estimated in the fatal case at 1,000 c.c. The rent in the splenic capsule, the scene of the haemorrhage, was found twice, but once omental adhesions prevented the attempt. Tamponage rather than suture was resorted to to control the haemorrhage; no attempt at removal of the spleen was made. In the fatal case, complete suppression of the urine supervened before death. At the autopsy, no fresh haemorrhage was found to have occurred, but there was a rent in the splenic capsule three inches long. The kidneys were granular.

As to the pathology, the authors consider that rupture of the splenic capsule is secondary to rupture of the engorged capillaries with haematoma formation and consequently increased tension. The condition is compared to spontaneous rupture of the spleen in typhoid fever (thirty-seven cases of this condition have been reported). The diagnosis in life presents certain obvious difficulties. The authors lay stress on Ballance's sign—*i.e.*, fixed dullness in the left flank, together with severe abdominal pain, symptoms of collapse, a history of previous malaria and the discovery of the malaria parasite in the blood. The conclusions are as follows:

(1) "Spontaneous rupture of the spleen in malaria occurs in rare instances.

(2) "The spleen does not necessarily have to undergo a great degree of enlargement for spontaneous rupture to occur.

(3) "Very deep palpation or forcible percussion of the enlarged malarial spleen should be avoided.

(4) "Exploratory puncture of the spleen for diagnostic reasons is not without danger.

(5) "The treatment of spontaneous rupture of the malarial spleen is surgical. . . . . ."

P. H. B.

Gasbarrini (Antonio). **Das Bordet-Gengousche Phänomen (Komplementablenkung) bei Malaria.** [The Bordet-Gengou Phenomenon (Complement Deviation) in Malaria.]—*Zeitschr. f. Immunitätsforsch. u. experiment. Therapie.* 1 Teil. Orig., 1913. Nov. 24. Vol. 20. No. 1–2. pp. 178–197.

The author reviews the works of Casagrandi, Frongia and other observers on the occurrence of the Bordet-Gengou reaction in malaria, and then enters into particulars regarding his own technique. The paper is almost entirely a laboratory one, and it will suffice if the author's conclusions are stated, together with a few notes on the clinical application of the test. He finds that:—

1. The blood serum of malaria patients during the rigor, when the temperature is falling, and for a very few days after the last recurrence of fever, does not cause any complement deviation. On the other hand, it does deviate complement, after having undergone treatment, *i.e.*, after having been freed of haemolytic amboceptors by some absorption method like that of JACOBÄUS and MINTZ, or the procedure of ROSSI.

2. The untreated serum of chronic malaria cases which had been free from relapses for a varying length of time, gave a more or less marked Bordet-Gengou reaction. Previous treatment of the serum almost always intensified the reaction.

3. Control sera from patients suffering from diseases other than malaria, and sera from healthy people have never, even when treated as above mentioned, yielded the reaction.

4. The serum of actively relapsing malaria cases has a greater haemolytic power than that of latent cases of the disease.

Gasbarrini notes that in one case his results did not altogether bear out the frequently advanced hypothesis that a positive Bordet reaction with malaria serum indicates a cure. He also deals with the value of the reaction as a diagnostic test in doubtful cases. In one instance, when it was positive, spleen puncture, at a later date, revealed the presence of macrogametes.

He concludes that it can be successfully used for the diagnosis both of latent malaria, and of actively relapsing malaria. In the latter the test is invariably positive, provided the serum has previously been treated by ROSSI's method for the removal of haemolytic amboceptor. It is, however, admitted that further research on the subject is required, especially in the direction of improving the method of preparing the antigen.

It has yet to be decided whether complement deviation occurs in cases of primary malaria and the influence of various stages of the infection, and of quinine, on the test have to be worked out. There seems to be little doubt that malaria confers an immunity which determines its varying ameliorations and aggravations seen in times of epidemic prevalence.

A. Balfour.

MACGILCHRIST (A. C.). **The probable Ratio of Relapses and Fresh Infections to the Total Attacks of Malarial Fever, and a Discussion of Quinine Dosage.**—*Indian Jl. Med. Research.* 1913. Oct. Vol. 1. No. 2. pp. 339-346.

Two important tables are embodied in this paper. The first gives the actual numbers admitted to the Jessore Jail hospital for malarial fever month by month, for eight years prior, and eight years subsequent to the introduction of quinine prophylaxis. The second table prepared from the first gives a consolidated view of the situation, the figures being reduced to a common denominator and thus affording a readier comparison.

The non-malarious season in Jessore extends from January to June. During that period new comers to the district seldom get an attack of malaria, and mosquitoes are comparatively rare. Both before and after the introduction of quinine prophylaxis, the average monthly

number of admissions for malaria per 1,000 prisoners is remarkably similar, about 25; the author considers this number to represent cases of relapse.

The average number of admissions per month per 1,000 prisoners during the fever season—July to December—before the introduction of quinine prophylaxis is above 40; this number, the author considers, represents 25 relapses and about 15 fresh infections; he thinks, therefore, that 3/13 of the annual total number of fever cases represents fresh infections. Could relapses be prevented by a system of quinine prophylaxis, the author thinks that the number of fresh infections would soon be enormously reduced.

The methods of giving quinine in prophylactic doses are given and criticized. The most effective method must be one which will allow the maximum concentration of quinine in the blood for the longest period. Patients who have never taken quinine should never receive an initial large dose, owing to a possibility of an idiosyncracy to the drug. Quinine poisoning is apt to occur if the drug is contaminated with other alkaloids of the cinchona bark, such as cinchonine and cinchonidine.

In order to get satisfactory results in the treatment of malaria, it is necessary to give larger and larger doses of quinine, and to repeat them more frequently. MacGilchrist therefore recommends 20 grain doses, with or soon after food, at intervals of eight hours, this treatment to be continued for the first three days. For after-treatment or disinfection, he gives 20 grains each night for a week or longer.

As a prophylactic in Jessore Jail 15 grains of quinine are given on two consecutive days each week, after meals, as if given before the prisoners tickled their throats till they vomited. This treatment does not disinfect the individual, but only keeps the malarial parasites in subjection.

P. H. B.

MacGilchrist (A. C.). **A Plea for a More Extended Use of Quinine Alkaloid.**—*Indian Jl. Med. Research.* 1913. Oct. Vol. 1. No. 2. pp. 347-351.

Very little quinine is absorbed from the stomach, most is absorbed from the small intestine. When the quinine salt reaches the duodenum it is precipitated in an amorphous form. The author believes that the amorphous precipitated quinine is the best all-round form to administer, both for treatment and prophylaxis of malaria.

The advantages of amorphous precipitated quinine base or alkaloid, are: (1) It is sparingly soluble in water and almost tasteless; (2) Absorption is as quick and complete as after the administration of quinine salts; (3) Being pure quinine, it represents quinine in the smallest bulk and weight; (4) Being non-haemolytic, it may possibly be used with great safety in diseases accompanied by haemolysis; (5) Low cost.

Quinine sulphate appears to be cheaper than quinine base, but is too soluble, 1:800, and therefore too disagreeable to take as a powder. Tablets of quinine sulphate are never so sure in action as in powder form; therefore any slight economic advantage of the sulphate becomes insignificant when compared with the quinine base. The use

of euquinine and quinine tartrate depends on their slight taste, due to their insolubility.

Quinine base can be administered intravenously without any danger of thrombosis or shock from irritation; it is three times as soluble in the blood stream as in water. By previous solution in alcohol and using normal saline as a diluent a solution of 1:2,000 can be obtained by means of which 15 grains of quinine alkaloid can be introduced in three pints of solution.

Quinine base in doses of ·004-·03 grammes per kilo weight was injected into rabbits intravenously dissolved in 33 per cent. alcohol (in a dilution of 1:135), without any ill-effects being observed.

The author concludes that the precipitated quinine base is the best all-round fôrm in which to administer quinine by the mouth or intravenously, and it is to be preferred in cases where haemoglobinuria is dreaded.

P. H. B.

Summa. **Zwei Malaria-tertiana-Rückfälle unmittelbar nach energischer Salvarsanbehandlung.** [Two Cases of Relapse in Tertian Malaria immediately after energetic Treatment with Salvarsan].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Dec. Vol. 17. No. 23. pp. 836-837.

At Windhuk, in German South West Africa, the action of salvarsan on tertian malaria is being tested. In two acute primary cases the results were very satisfactory, the drug, given intravenously in a dose of 0·6 gramme, causing a rapid disappearance of parasites from the blood. In certain cases relapses were noticed, and these at first were attributed to insufficient dosage, salvarsan being regarded as fully the equal of quinine. Two recent cases, however, have demonstrated the superiority of the latter drug. These cases, which are described in some detail, were treated energetically with salvarsan. In neither was there any possibility of reinfection. Both, during the relapses, showed sexual forms of the malaria parasites in the blood. The relapses occurred three weeks after the last salvarsan injection. The author, as a result of his observations, suggests a combined therapy with salvarsan and quinine. He intends trying it.

A. B.

Lamballe (F. W.). **The Utility of Enzymes in Malaria.**—*Jl. R. Army Med. Corps.* 1913. Dec. Vol. 21. No. 6. pp. 660–669; and *Med. Record.* 1913. Nov. 27. Vol. 84. No. 21. pp. 928-931.

The author is no believer in the efficacy of quinine in malaria. This doubt he has held for the last ten years since he had a large experience in Hong Kong, where the admission rate to hospital for malaria was 2,400 per thousand troops; that is, every man in garrison was a patient in the hospital nearly two and a half times every year; nearly all the admissions being cases of relapse.

To prevent relapses in the Indian troops, the quinine treatment is being systematized as follows:—(1) No case is diagnosed as malaria until the parasite has been discovered in the blood; (2) No case of

malaria leaves hospital until the peripheral blood shows no plasmodium; (3) After leaving hospital, all malaria patients are placed on a "malaria register" and attend for further treatment. Benign cases receive quinine sulphate in acid solution 10 grs. daily for one week, and afterwards thrice weekly, until four months of quinine treatment have been completed. Malignant cases receive quinine in the same form, 10 grs. daily for one month, and afterwards thrice weekly for three months longer.

In spite of these measures, relapses occur. As regards the etiology of these relapses, Lamballe quotes Beard's work (1907) on the part played by ferments in the protection of the animal body. From this it is inferred that schizogony of the malaria parasite produces the clinical disturbance called fever; asexual growth of the parasite can proceed to an unlimited number of generations or cell divisions, until checked by the natural protective ferments of the animal body. In the same manner as the trophoblast is checked in its growth by the ferments of the developing embryo, so the natural protective ferments of the host react against the asexual phase of the parasite and sexual forms begin to appear; these are harmless.

The varying degree of immunity, the degree to which the malaria remains dormant, is a measure of these natural protective ferments. As these ferments are insufficient to destroy the asexual forms, the disease recurs. There is no essential pathological difference between the cases termed "relapse" and those called "recrudescence."

From Beard's work it follows that the natural means of destroying the organisms of such tropical diseases as malaria, trypanosomiasis, yellow fever, relapsing fever, and kala azar are the use of the powerful pancreatic ferments, trypsin and amylopsin.

In January, 1913, an opportunity presented itself to the author of testing these theories. Cases of severe infection and those showing relapses were selected. Fairchild Bros. and Foster's injections were used in ampoules of 1 cc. The *injectio trypsini* had a digestive value of 1,850 Roberts units, the *injectio amylopsini* contained 500 Roberts amylolytic units. These injections are sterile and stable in the tropics, and are given hypodermically or intramuscularly. Lamballe gives one ampoule of amylopsin and one of trypsin at the same time; a local oedema develops at the site of the injection. As a rule, a single dose is sufficient to clear the peripheral blood of parasites. In severe cases the injections are continued until the injections themselves cause a rise in the patient's temperature. When this so-called "trypsin reaction" takes place, the patient is fully under the influence of the treatment. Usually this occurs with the third injection, after which the worst cases have remained free from relapse.

Details of twelve clinical cases are given, all occurring in British soldiers, in whom previous quinine treatment had failed to prevent relapses; some even were suffering from cinchonism. The rapidity with which the parasites disappeared from the circulation is remarkable; even the malignant crescents disappeared after the first injection.

[The author does not say whether intramuscular injections of quinine were first tried in these twelve cases; it is possible that these would have proved equally effective. It would be interesting to observe whether these ferments have any effect on cultures of the malaria parasite *in vitro*.] P. H. B.

Orenstein (A. J.) **Screening as an Antimalaria Measure. A Contribution to the Study of the Value of Screened Dwellings in Malarial Regions.**—*Proc. Canal Zone Med. Assoc. for Half-year, April to Sept.* 1912. Vol. 5. Part 1. pp. 12-17. With a sketch map.

An unusual opportunity of studying the relative value of screening against mosquitoes, in a country where malaria is endemic and rather prevalent, exists in the settlement of Gatun in the Canal Zone.

In the principal settlement of Gatun, founded in 1906, primarily for the accommodation of employees engaged in the construction of the canal, all the buildings were thoroughly screened with the approved eighteen-mesh copper gauze. A village known as New Gatun sprang up in proximity to the European settlement. In New Gatun the houses are not screened.

An attached map shows the relative geographical position of Gatun and New Gatun; the Anopheles breeding areas are at an equal distance from each. The population of Gatun consists of 500 Americans in bachelor quarters, 1,500 white Europeans in barracks, 200 Americans in married quarters, 1,000 West Indian natives in barracks, and 1,300 others living in miscellaneous quarters. All quarters are screened. The population of New Gatun, engaged in approximately the same work, consists of 2,500 West Indian natives and European labourers, all of whom live in unscreened houses, and about 2,500 others. As far as malarial incidence is concerned, the two settlements differ in only one respect, namely, the screening of the sleeping quarters.

A brief explanation of the method used in computing percentages of malaria is given. At the end of each week the District Physician reports to the Chief Sanitary Officer the number of cases of malaria seen by him that week; the number of cases of malaria for each district are then computed as percentages of the total number of employees residing in the district. In arriving at the "Average Monthly Percentages" of employees for Gatun and New Gatun, the weekly percentages for each year were added and the sum divided by twelve, thus arriving at an average per month for each year. These important figures are represented in the tables, one of which is here given :—

Table II.—Malaria incidence in Gatun and New Gatun during the months of May to September, both inclusive, of each year (when Anophelines are most numerous).

Year.	Gatun.	New Gatun.
1909	5·35%	10·04%
1910	5·37%	9·21%
1911	8·75%	12·59%

During these months of greatest Anopheline prevalence, the relation of malaria incidence for Gatun and New Gatun is as 2 to 3.

The deaths from malaria among employees residing in the towns of Gatun and New Gatun is shown in Table III :—

Year.	Gatun.	New Gatun.
1909	5; =1 per 1,000 ..	4; =2·7 per 1,000.
1910	9; =1·7 „ „ ..	4; =1·6 „ „
1911	2; = ·4 „ „ ..	3; =1·2 „ „

These figures do not show two factors of great importance :—

(1). The employees residing in screened barracks are not allowed to

remain in the barracks unless they bear a physician's certificate; this results in every case of malaria being seen by him. The employees in unscreened barracks are not so controlled, and consequently many cases of malaria amongst them are missed.

(2). The proximity of the unscreened settlement with its large number of malaria carriers furnishes a number of infected Anopheles, these affecting to some extent the employees residing in the screened quarters who quite frequently spend their evenings in New Gatun.

The paper concludes with a few maxims regarding screening, which are given in full.

1. Screening to be effective must be thorough.
2. A screened dwelling with defects in the screening, (ill-fitting doors etc.) is probably worse than an unscreened dwelling, for in such a house, mosquitoes though readily finding an entrance, once having entered, will not leave.
3. The wire gauze screening must have a sufficient number of strands per square inch to ensure the impossibility of mosquitoes entering. Eighteen mesh gauze is used in the Canal Zone, and is effective.
4. The screening must be tight, this will prolong its life.
5. All doors should open outward, and should be provided with an efficient closing device, and should be hung so that they will not warp or sag.
6. Windows should not be fitted with removable or sliding screens. Practice has shown that the average person will not use care in keeping adjustable screening carefully closed and mosquito proof.

In the Canal Zone screening does not make the rooms much hotter. The temperature seldom rises above 94° F; the average daily temperature is approximately 80° F. The highest grades of copper only are used, and the screening is kept free from dirt and products of corrosion by frequent brushings.

The conclusions are as follows :—

"1. A properly screened dwelling can be depended upon to reduce by at least one third the malaria incidence in a locality where malaria is endemic.

"2. In order to be effective, screening must be carefully planned, well installed, and kept in good repair."

In the discussion which followed the reading of this paper, Colonel Gorgas expressed his personal opinion of the value of screening; he considers that it will never be dispensed with, as one can never be sure of the disappearance of mosquitoes.

[If anything could increase one's admiration for the sanitary work of the Americans in Panama, it is the conciseness and brevity of their papers, of which this is an excellent model.]

P. H. B.

Gunasekara (S. T.). **Report on the Anti-malarial Campaign at Kurunegala.**—13 pp. folio. With 4 plates, 4 maps, and 1 chart. 1913. Colombo: Printed by H. C. Cottle, Govt. Printer.

A very full and instructive account of the campaign against malaria in the town of Kurunegala, Ceylon, referred to in this *Bulletin* (Vol. 2, p. 535).

This campaign, begun in September 1911, was the first systematic attempt in Ceylon to deal with the disease by antimosquito measures; this report deals with the measures adopted.

An account of the town, the population, and climatic conditions is given. A chart shows the seasonal incidence of malaria over a period

of eight years, from which some conclusions as to the epidemiology of the malaria in the district are derived.

(1) Every 12 months there are two rises in the curves of rainfall, temperature, and malaria incidence.

(2) The fastigium of rainfall and temperature generally coincides.

(3) The malaria incidence commences to rise after the climatic fastigium, and reaches its maximum three or four months after.

(4) In the years 1906, 1908 and 1911, malaria assumed epidemic proportions (over 2,300 cases in a population of 8,000 in 1911).

(5) In each of these years preceding the epidemic, there was a period of very low rainfall, succeeded a month before the onset by a sudden rise in the rainfall of short duration, and insufficient to cause flooding.

Some interesting figures of the number of Government servants temporarily incapacitated on account of malaria are given; in 1910, out of a staff of 189, this was no less than 68, a percentage of 37·9. It is hoped that these statistics will appeal to the Government and instigate it to adopt further preventive measures. An account is given of the methods so far adopted, which were recommended by a Committee appointed by the Government. These were based on the usual lines, and appear to have been excellently carried out; they included public lectures and educational courses in the various schools. General sanitation has not been neglected. Gunasekara regards the paddy fields situated in the centre of the town as the main factor in the situation; he gives a table showing the condition of these fields during different months of the year, from which it is apparent that they contain anopheline larvae all the year round, in spite of the presence of the four species of larvivorous fish, of which drawings are given to scale. The highest spleen rates are found in collections of houses in close proximity to the paddy fields.

The most instructive part of the paper from the point of view of tropical sanitation, deals with the effect of certain larvicidal preparations in the field. Xex-green, a heavy oily liquid said to be innocuous to cattle, was tried. It was less effective than petroleum, and more expensive.

Potassium cyanide, as recommended by Ross, was found in the laboratory to kill culex and anopheline larvae in a dilution of 1 : 75,000; higher dilutions had no effect on anopheline larvae. In the field results were very variable, and a dilution 1 : 37,000, or eight times the strength recommended by Ross was required.

A commercial preparation of potassium cyanide, containing 10 per cent. of the pure salt, was tried but on account of its poisonous nature had to be abandoned.

Sanitas-okol, as sold by the "Sanitas" company, was found to be an effective larvicide in a dilution of 1 in 1,280 (two teaspoonsful to the gallon). Sanitas-okol is easily miscible with water. Phenyle was found to be just as effective and has the advantage of being cheaper; it is practically non-poisonous to cattle.

Izo-izal is said to be non-poisonous, and to be easily mixed with water. Experiments in the laboratory and in the field showed this preparation to be far more toxic to larvae than Phenyle. "Larvicide" is another preparation sold by the proprietors of Izo-izal, but Gunasekara found it less toxic to larvae; he suggests that Izo-izal is the ideal larvicide if only it could be procured at a sufficiently cheap

rate in Ceylon. "Pesterine," a mixture of equal parts of crude petroleum and kerosine, was found to produce an even film when spread on the water, but in the presence of much floating refuse and aquatic vegetation in the rice fields it was worse than useless; open pools in Kurunegala had to be oiled every four days to be at all effective.

The use of larvicides in the rice fields was found to be, from obvious considerations, quite an impracticable measure.

The author concludes as a result of his campaign :—

(1) Minor measures are of little avail, as the paddy fields are the chief breeding places of the anopheles in Kurunegala.

(2) Measures, such as mosquito-nets, screened rooms and quinine distribution, can never become universal, as only a small proportion of the town people can afford them.

(3) The only method of preventing the breeding of anopheles in paddy fields is to prohibit their cultivation.

The recommendations for future work coincide in the main with those given in the reviewer's report already referred to, which was drawn up after consultation with Gunasekara. A number of appendices and some quite instructive photographs close the report. Special attention should be paid to the first photograph, which illustrates the condition in which drains should not be kept.

[The author is to be congratulated on the sensible view he has taken of the situation. He does not wish to abolish all paddy fields, which afford a source of food and employment to so many natives, but only those which are by reason of their situation dangerous. The Ceylon Government can also be congratulated on the amount of work done over a period of 22 months, for the comparatively low cost of £998.

A few criticisms might be offered. The spleen rates given by Gunasekara are much higher than in the reviewer's report on the same subject, which were obtained by palpation. Gunasekara appears to have employed the percussion method alone, although he does not state so in his report. A comparison of spleen rates obtained at various periods is of little value in showing the reduction of malaria, unless every care is taken to ensure employment of a uniform and reliable method. It is to be regretted, too, that the total number of blood examinations, or the proportion of the various parasites found at various seasons, are not stated. A large number of apparently wild mosquitoes were dissected, and individual specimens of *Myzorhynchus sinensis* and *Myzomyia culicifacies* are said to have been found infected. We are not informed either of the number of insects dissected, the proportion found infected, or the stage of the parasites they contained.

In view of the difficulty experienced by the author in identifying the various anopheles in Kurunegala, it would be advisable to repeat the dissections of *M. sinensis*, which has only rarely been found naturally infected elsewhere.]

P. H. B.

Watson (Malcolm). **Mosquito Reduction and the Consequent Eradication of Malaria.**—*Trans. Soc. Trop. Med. & Hyg.* 1913. Dec. Vol. 7. No. 2. pp. 59-70.

An account of Dr. Watson's well-known work on malaria prevention in rural areas in the Federated Malay States, most of which has already been published.

The work began in 1904 when the Government contributed 110,000 dollars for the drainage of 24,000 acres. Since then, with the drainage and cultivation of the land, malaria has disappeared over some 500 square miles.

A definite connection was traced between the malaria and its carrier, *A. umbrosus*, a breeder in stagnant jungle pools. The spleen rate was found to diminish the further the population was removed from the jungle pools, and malaria had completely disappeared half a mile away from such a pool. The death rate was found to correspond with the spleen rate. The knowledge derived from Dr. Watson's experience permitted two important rules to be drawn up for the guidance of the planters. These were—

(1) Removal of habitations to a distance of half a mile from the jungle pools, or

(2) Felling of jungle and drainage of jungle pools for a similar distance.

As a result of these measures, the spleen rate on many estates is now ·5 per cent., and the death rate from 5–20 per 1,000.

An account is next given of the anti-malarial measures in the hill land, where malaria was rife. Public works, as well as private enterprise, were time and again brought to a standstill. The malaria carrying anopheles was found to be *A. maculatus* (termed by Dr. Watson at that time *N. willmori*), which bred in the clear and rapidly flowing mountain streams. These streams were consequently put underground, and immediate improvement resulted. The daily sick dropped on North Hammock Estate from 13·5 per cent. in 1911, to 2·2 per cent. in 1912, the spleen rate from 91 per cent. to 14 per cent.

Dr. Watson has also studied the wet cultivation in the Malay States. He found 66,000 acres in Krian practically free from the disease, only 2·7 per cent. of the children having enlarged spleens; four species of Anopheles were present, *rossii*, *mochii*, *sinensis* and *barbirostris*, none of which, with the doubtful exception of *sinensis*, is known to be an efficient malaria carrier, but in an open valley near by he found much malaria, and an additional three species of anopheles, *umbrosus*, *nivipes* and *albirostris* were present, and in the hills on both sides of the valley *A. maculatus*. The author concludes that the rice fields are not in this instance a factor in the situation.

Watson is struck with the similarity in the distribution of the malaria in the Malay States and in India. *A. maculatus* is also the chief carrier of hill malaria in India, though erroneously termed *A. metaboles* in the reports of STEPHENS and CHRISTOPHERS; therefore a parallel can be drawn between malaria in the Malay States and that of the Duars and Jeypore Hills, regions of intense endemicity.

To determine whether his views on the eradication of rural malaria could be applied to other countries, Watson visited Sumatra, Panama and British Guiana.

In Sumatra, though only 35 miles distant at the nearest point from the Malay Peninsula, the death rate of the labour force is very low. A fairly high spleen rate was found on the mangrove coast line and inland near to a swamp, but no trace of malaria, and no stream-breeding anopheles in the hill-land. *A. maculatus* has never been taken there.

The sanitary system in the Panama Canal Zone was studied during

a stay of three weeks. As is well-known, drainage is mainly relied upon, oiling being only a subsidiary measure when drainage is impracticable. Draining is done for 200 yards round each building, but screening, though formerly of great value, is considered of less importance nowadays. The chief anopheline carriers in Panama are *Cellia albimanus* and *Cellia argyrotarsis*. Both breed in running water.

British Guiana is of interest because in it are found the same anopheles as in Panama. Most of the cultivated land is below high tide level and has to be protected by sea defences. The high spleen rate of the British Guiana plantations is associated with a low death rate. This apparent anomaly Dr. Watson found to be due to the inclusion of all spleens said to be enlarged by "percussion." The healthiest estates are Port Mourant and Albion on the Corantyne Coast. Here the hospital death rate is only 5·6, and the spleen rate 2 per cent; here were numerous drains and canals receiving only the attention necessary for estate work, and no oiling of the edges; the population were settled on the edges of 3,000 acres of rice swamp, but no anopheles were found in these drains or swamps. Evidently for some reason or other this area is not suitable as a breeding ground of anopheles.

In Barbados Dr. Watson confined his attention to ascertaining whether the absence of malaria is due to the presence of "millions" or the absence of breeding places suitable for anophelines. In his opinion the absence of suitable breeding places is the real explanation.

[In the discussion, G. C. Low gave reasons for doubting this.]

P. H. B.

Manteufel. **12 Jahre Malariabekämpfung nach dem von Robert Koch angegebenen Verfahren.** [Twelve years' experience of Anti-Malarial Measures as suggested by Robert Koch.]—*Zeitschr. f. Hyg. u. Infektionskr.* 1913. Dec. 12. Vol. 76. No. 2. pp. 350-360.

From 1901 to the end of 1903, an expedition under Ollwig was at work in Daressalam in German East Africa. As a result of the campaign in that town similar measures were undertaken elsewhere, as for instance in Tanga. The paper is a retrospect of the effect of these measures. Red Cross sisters are responsible for the practical application of the scheme, and to them are attached several Goanese skilled in microscopy. In Daressalam there are two, but in Tanga only one such sister. Blood films are examined by Ross's thick film method and stained by Giemsa.

All infected persons are dosed with quinine (15 grains every six days for adults); the natives try to avoid this method by every possible means. Mosquito nets and screening of European houses has only lately become universal, and anti-mosquito measures have been only recently undertaken.

It is not possible for many reasons to give accurate statistics of the amount of malaria amongst Europeans in Daressalam; nevertheless, the author gives certain figures which, unfortunately, indicate that neither the case incidence nor mortality from malaria and blackwater fever has fallen during the last twelve years. On the other hand, a slight reduction in the blood infections is indicated by the result of a yearly blood examination made on all Europeans since 1907.

Amongst the natives, both adults and children, the malaria parasite rate has risen to an alarming degree (in Tanga from 35 to 81·5 per cent.). Their dislike to quinine prophylaxis increases from year to year; according to the author the native suffers much more inconvenience from the effects of the quinine than from the malaria. Amongst the Europeans it is also becoming more unpopular every year.

Therefore, in face of active and passive resistance, Koch's methods are yearly becoming more and more difficult to carry out. The effect of general education measures is seen in the diminution of numbers of fresh infections amongst the European population, but they are still as prevalent as ever among the Goanese, Indians, Arabs and natives, who are unable to carry out any personal hygienic measures. The Goanese and Indians are very liable to blackwater fever. The mortality from malaria amongst the native children is very large; even the adults do not acquire complete immunity, as the author has seen them die of cerebral malaria. The author suggests that the large sum of money (£1,000 per annum) now expended on quinine would be better utilized on general sanitary measures. In 1912 he proposed to the Government to restrict the quinine distribution to the Europeans and to the natives living in European quarters. In 1911 and 1912, Lurz and the author initiated anti-mosquito measures by spraying out the native huts with Giemsa's "Mosquito Fluid" in order to kill off all infected anopheles. No figures are yet available to show the effect of these measures.

The author hopes that the Government Anti-Mosquito Regulations of January 1st, 1913, will be properly carried out, especially with regard to screening of European houses and the segregation of the natives and European quarters.

The conclusion is inevitable that, though Koch's quinine prophylaxis has been successful elsewhere, it has for various reasons failed in Daressalam.

[No estimation of the spleen rates appears to have been made in demonstrating the incidence of malaria. Blood examination alone has been relied upon. It is obvious that in drawing up such a comparative statement as is made in the author's tables there are many sources of fallacy, such as the methods employed in making and staining the films, the stage of the disease, and lastly the personal equation.]

P. H. B.

von Celebrini (Emil). **Malariabekämpfung im österreichischen Küstenlande.** [The Control of Malaria in the Austrian Littoral.] —*Das österreich. Sanitätswesen.* 1913. Nov. 27. Vol. 25. No. 48. pp. 1593-1599.

The author, who is a disciple of Celli, is resident in Trieste, and has had very considerable experience in the organisation and prosecution of the anti-malarial campaign which has been in operation upon the Austrian littoral since 1903. Every known and approved method of attacking the disease and its carrier has been employed. At an early date it was found that if quinine prophylaxis was to be really effective the drug must be given in daily doses. When thus administered all unpleasant symptoms cease after the third day of treatment. For children, who form the main reservoir of the parasites, chocolate

pastilles containing the tannate are found indispensable, and the importance of *thoroughly* treating children under ten years of age cannot be too strongly insisted upon.

Information is furnished as to the factors determining the incidence of malaria in certain localities. Amongst these the poverty and malnutrition of the inhabitants play a notable part. It has been observed that the badly nourished are unable to tolerate quinine in large doses, while in the case of those sufficiently fed its action is so beneficial that it is a popular remedy amongst the people generally. The author lays stress on the necessity of blood examination, both as a means of diagnosis and as a guide to treatment. A spleen survey alone is quite unreliable. Splenomegaly is often present in children without malaria. It is seen in cases of rickets. On the other hand it is frequently almost imperceptible in children showing malaria parasites in their blood. [See this *Bulletin*, Vol. 2, p. 537.] There are some remarks on petrolage fumigation for mosquitoes, the use of Giemsa's spray and of larvivorous fish. As regards the last-named, it is interesting to note that in one pool a fresh-water crab was found to be a dangerous foe to the fish [species not stated.] It is evident from the particulars given that before any systematic anti-mosquito campaign is undertaken the biology of the anophelines of the various districts requires thorough investigation. There are other matters of interest considered in this paper, but it is sufficient to quote the author's conclusions, which are briefly as follows :—

1. The only rational way of controlling malaria in the Austrian littoral is by a systematic curative and prophylactic quininisation of the inhabitants.
2. In order to keep the peripheral blood free of parasites in the malarial seasons, the quinine must be given daily. A daily prophylactic dose of 0·4 grammes for an adult is, as a rule, satisfactory.
3. For treating children, the use of tablets of quinine rendered agreeable to the taste is essential. Without a general treatment of children, malaria cannot be controlled.
4. The destruction of anophelines is generally difficult to accomplish, and must be preceded by a careful biological survey of the region under consideration.
5. Mechanical prophylaxis is costly and of little value. Moreover it is difficult to carry into effect.

A. B.

Külz (L.). **Selbstversuch mit einer neuen Prophylaxis auf Grund der Malariaprodrome.** [Personal Trial of a Prophylaxis based on the Occurrence of a Malarial Prodrome.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1913. Dec. Vol. 17. No. 23. pp. 834-835.

In Kamerun the author has noticed certain definite prodromata in tropical malaria. He does not know if they also occur in benign tertian and quartan infections, as he has had little experience of these forms. In malignant tertian infections prodromal symptoms vary in intensity and completeness, but if sufficient care be taken to recognize them they are found never to be wholly absent. They occur two or three days before the actual onset of the paroxysm, and affect chiefly the nervous system. The patient becomes low-spirited and irritable. He has a slight headache, a feeling of fatigue and some rheumatic pains. A greatly increased appetite is often followed by anorexia, while excessive thirst is even more common. Nothing special is found on

examination. There are no parasites in the blood, but some punctate basophilia is frequently present. A very small rise of temperature, accompanied by slight rigors in the afternoon may occur. In his own case, the author was on the alert for this "aura," and at once took quinine. As a result, he has abandoned the use of the ordinary tedious and prolonged quinine prophylaxis. He has given the new method a six months' trial, and claims to have aborted attacks of malaria on three occasions. As soon as he recognizes the "aura," he takes 0·2 gramme of quinine. This is repeated twice on the first day, *i.e.* 0·6 gramme altogether. On the second day he takes 0·2 gramme on two occasions. In this way during the prodromal period he takes in all one gramme of quinine. During the half-year he supplemented this dosage by three grammes of quinine, and he remained exempt from any malarial attack. He also treated a series of Europeans whom he was able to watch closely in a corresponding manner, and with a similar gratifying result. He, therefore, considers that by watching for the prodromal symptoms, malarial attacks can be aborted by comparatively small doses of quinine. At the same time he cautions against the indiscriminate use of this method in the hands of laymen. It should be carried out under medical control.

Encouraged by these results, he has also tried treating cases of acute malaria by doses of 0·2 gramme of quinine, given thrice daily, and though he has few cases to record he finds the drug acts as promptly as when gramme doses are given.

A. B.

Rossi (Giacomo). **Risultati di una Inchiesta sulle Condizioni Malariche e sulla Lotta Agricolo-antimalarica nelle Provincie di Benevento, Caserta e Salerno.** [Results of an Inquiry into the Malarial Conditions and the Anti-malarial Campaign in the above-named Provinces.]—*Propaganda Antimalarica.* 1913. Oct. 31. Vol. 6. No. 5. pp. 107-115.

Analysis of replies to a set of questions sent out to the public authorities of the districts of Benevento, Caserta and Eboli in Campania, with a view to obtaining information as to the present state of the anti-malarial campaign in those districts, and the results obtained after ten years of official effort in combating malaria. The returns obtained were very partial, owing to the apathy of local officials. So far as they go, they seem to indicate that the Italian provincial quite appreciates the gratuitous distribution of quinine by the State, but that all sanitary works dependent upon local initiative, such as draining and cultivation of the soil, remain sadly in arrear. The paper is of local interest only, and makes rather melancholy reading from its pessimism.

J. B. Nias.

Kenrick (W. H.). **Malaria and Colour.**—*Indian Med. Gaz.* 1913. Dec. Vol. 48. No. 12. pp. 473-474.

The author thinks that the high degree of immunity to malaria possessed by the African negro is due to the high degree of skin pigmentation; he asserts that certain darkly pigmented aboriginal East Indian races possess a similar high degree of immunity. Amongst

the Korkus, Gonds and Baigas, aboriginal tribes inhabiting the forests of the Central Provinces of India, the fairer children are said to have a higher degree of splenic enlargement than the darker ones.

Where members of two tribes are found occupying the same village, those with darker skins will be found to possess a lower spleen rate, especially amongst the children, and the adults a lower fever rate.

The author thinks that malaria prevents the pigmentation of the skin which protects from sun exposure, and that therefore a malaria-infected subject is more susceptible to the heat of the sun's rays. He considers the observation supports the haemoglobin rather than the epidermal origin of skin pigmentation.

[No figures, statistics or experiments are given in support of these rather dogmatic statements.]

P. H. B.

Carter (Henry R.). **Malaria in North Carolina.**—*U.S. Public Health Rep.* 1913. Dec. 19. Vol. 28. No. 51. pp. 2739—2760.

A survey of malaria prevalence in certain districts of North Carolina with a view to advising the health authorities of that State on the means to be taken for its control.

For this purpose thirteen towns were visited. Anopheline larvae were found in all but one. Suggestions for anti-mosquito measures were made in each town, and public lectures were delivered. It is interesting to note that Carter during his travels did not meet with a single physician capable of recognizing anopheline larvae. No definite statistics of the prevalence of malarial fever or its virulence in the different localities could be obtained, but apparently it is far less prevalent than 20–30 years ago. The increased prosperity of the country people and the lowered price of quinine are given as reasons for this diminution.

P. H. B.

Leger (M.) & Bouilliez (M.). **Recherches expérimentales sur *Plasmodium inui* Halberstädter et Prowazek d'un *Macacus cynomolgus*.**—*Ann. Inst. Pasteur.* 1913. Nov. 25. Vol. 27. No. 11. pp. 955-985.

The first part of the paper is practically a reprint of that reviewed in this *Bulletin*, Vol. 1, p. 26. The authors make a further contribution to the life history and pathogenicity of *Plasmodium inui*. This plasmodium, which much resembles *P. vivax*, produces sixteen merozoites and the degenerative condition of the red cell known as Schüffner's dots. It is pathogenic to several species of monkey, but the chimpanzee and the maki of Madagascar are refractory. In the infected monkeys the infection causes, curiously enough, hardly any rise of temperature.

Post-mortem examinations revealed no lesions save a pigmentation of the organs. Attempts to transmit the parasite to other animals, notably to lemurs, a group closely allied to the Primates, proved ineffectual. Quinine in large doses was given, but the authors were unable to decide whether it was prophylactic against infection; it was found to have no curative effect whatsoever.

Some interesting splenectomies on infected monkeys were performed; many died after the operation from causes other than the plasmodium, but as might have been expected removal of the spleen had no effect either on the numbers or morphology of the parasite. All attempts to cultivate the parasite by Bass's method failed.

The paper ends with a short paragraph on the differential diagnosis of the parasite. Four species of pigment-producing Plasmodium are known to occur in monkeys. *P. Kochi* (Laveran, 1899). *P. pitheci* (Halberstädter & Prowazek, 1907), *P. inui* (Halb. & Prow., 1907), (identical with *P. cynomolgi* Mayer), and *P. brasilianum* (Gonder & Berenberg-Gossler, 1908).

P. kochi has been found in nature in *Cercopithecus sabaeus, C. babuinus, C. albigularis, C. fuliginosus*—all African species. The development of the parasite takes place in from 24–50 hours. The schizonts resemble those of the benign tertian parasite and consist of 8–14 merozoites. The host cell is not hypertrophied; Schüffner's dots are present.

P. pitheci is found in the orang-outang of Borneo and cannot be transmitted to the lower apes. The young schizonts resemble those of the subtertian parasite; schizogony is complete in 48 hours; the cell host is not hypertrophied and contains degenerating granules more resembling Maurer's than Schüffner's dots.

P. brasilianum has been studied in *Brachyurus calvus* from the Amazon River. This haematozoon greatly resembles the quartan parasite (*P. malariae*). It does not hypertrophy the host cells at all, nor give rise to Schüffner's dots.

P. inui is found in monkeys of the genus Macacus. The schizonts contain 12–16 merozoites and development is complete in 48 hours. It is probably identical with the plasmodium described by Mayer from a *Macacus cynomolgus* imported from Java.

As a result of these researches, the authors are unable to place much reliance on such characters as Schüffner's dots and the size of the host cell in differentiating these parasites; such features were only inconstantly present in *Pl. inui*. They consider the pathogenic action as being much more reliable.

P. H. B.

BLACKWATER FEVER.

STEPHENS (J. W. W.). **Studies in Blackwater Fever.**—*Ann. Trop. Med. & Parasit.* 1913. Dec. Vol. 7. No. 4. pp. 479-507. With 2 charts.

A carefully reasoned paper* based on statistics compiled from numerous sources, and showing the close relationship existing between malarial infection and blackwater fever. The results certainly bear out the conclusion of CHRISTOPHERS and the author to the effect that blackwater is malarial in origin, but occurs only in those who are in a condition induced by repeated malarial infection lasting over a certain time. The subject is considered under the following headings: (1) malarial parasites; (2) pigmented leucocytes; (3) post-mortem examination; (4) influence of malaria; (5) relationship to species of malaria parasite; (6) effect of period of residence; (7) seasonal prevalence; (8) correlation between malaria and blackwater statistics; (9) second attacks. The strongest proofs are forthcoming under the headings (1) and (8), but well-nigh every one of them goes some way towards establishing the author's hypothesis, and he has had the advantage of having his figures checked by the Statistician of the Liverpool School of Tropical Medicine. The paper, which is full of interest, requires detailed study, the numerous tables and the two charts being specially worthy of attention, but a few points may be noted here. Under the first heading the record of 390 cases of blackwater is considered, and these cases are classified in three groups according as malarial parasites were found on the day before, the day of, and the day after the onset of blackwater. The tables show that on the day before haemoglobinuria occurred 73 per cent. of the cases exhibited parasites, on the day of the onset 47·5 per cent., and on the day after 23 per cent. The parasites, therefore, disappear during the course of the disease, a phenomenon which the author considers is in all probability due to the accompanying acute haemolysis. He admits, however, that it seems certain that relapses occur during the course of the disease without the occurrence of parasites in the blood.

As regards the question of pigmented leucocytes the figures given are small, and only suggestive. More observations are required in this connection. Post-mortem examinations of 31 cases showed malarial pigment present in 83·9 per cent. It was not found in five cases, a fact on which Stephens comments as follows:—

"If the absence of pigment P.M., supposing the facts correct, definitely excludes malaria then some blackwater cases must be due to other causes, which one must admit is not impossible, although I believe the facts prove that malaria is the dominant factor."

The question of the relationship to species of malarial parasites is considered in the light of figures culled from the observations of DEEKS and JAMES, and of LOVELACE. A discrepancy is apparent, as the former show that malignant tertian is the form chiefly associated with blackwater, while the latter indicates that it is chiefly associated with simple tertian infection. It would seem, however, that LOVELACE was dealing with a simple tertian parasite showing increased virulence.

* The substance of this paper was read before the Tropical Section of the International Congress of Medicine, 1913.

So far as figures are available they indicate that it is in the second year of residence in the Tropics that the greatest number of blackwater cases occur. Stephens believes that this is evidence of the part played by repeated malarial infection.

Lack of space prevents any detailed summary of the important section dealing with the correlation between malaria and blackwater fever statistics. The author chiefly relies on the returns for malaria and blackwater fever in the Panama Canal Zone and more especially on the record of admissions into Ancon Hospital, for here the data are classed according to race, and are available for each month over a period of five years. A chart shows the incidence of malaria and blackwater fever on "Americans" (intelligent; living under hygienic conditions; properly treated when attacked by fever; receiving pay when in hospital); "Europeans"—Spaniards, Italians and West Indian negroes (!) (those desiring it live in mosquito-proof houses; careless as regards individual prophylaxis; indifferent to personal hygiene; *receiving no pay when in hospital*); "Negroes" (badly housed no personal hygiene). It is in the "Europeans" who suffer severely from malaria that blackwater occurs. There is very little amongst "Americans" or "Negroes." Commenting on this the author says:

"Now it appears to me that the explanation is obvious, viz., that blackwater depends upon malaria. Of course it is possible to argue that the relationship depends upon the fact that we are dealing with two diseases both inoculated by the mosquito, or that those suffering from malaria are debilitated and so open to the attack of this hypothetical other disease, and even if for argument's sake we were to admit such hypotheses we should still be in the position that this disease affects those suffering from malaria. But we consider that the obvious explanation is the true one. And again, the figures lend no support to the view that there is a quinine haemoglobinuria distinct from blackwater fever, because, if so, we should expect it in the Americans—the quinine takers."

[It has been well said that statistics may be made to prove anything and, of course, one may reasonably ask if all the observations and records on which the author builds up his case are absolutely reliable. At the same time there can be no doubt that this paper is highly suggestive and is a very useful contribution to the literature. It should certainly be in the hands of all students of malaria and blackwater fever.]

A. B.

Napier (A. H.). **Is Syphilis a Factor in Blackwater Fever?**—*Indian Med. Gaz.* 1913. Oct. Vol. 48. No. 10. pp. 389-390.

The author concurs in the theory which regards syphilis as the cause of blackwater fever. He states that the latter is found in syphilitic cases giving a positive Wassermann reaction, the actual onset of the disease being brought on by chill, over-exertion, administration of quinine or an attack of malaria. He considers blackwater fever to be symptomatically indistinguishable from paroxysmal haemoglobinuria; indeed he regards the two conditions as practically identical, and notes that Dickinson reports a history of malaria in 71 per cent. of his cases of paroxysmal haemoglobinuria. The author then proceeds to show from the literature on the subject that there is an apparent connection between syphilis and paroxysmal haemoglobinuria, and tries to trace a similar relationship between syphilis and the haemoglobinuria of blackwater fever.

He suggests that the Wassermann test should always be carried out in cases of blackwater fever [obviously an utter impossibility in the majority of cases] and, if positive, that salvarsan should be given.

[While syphilis may play a part in the etiology of some cases of blackwater fever, just as any other debilitating condition may do, it is very unlikely that it stands in any direct etiological relationship to it. The author has not considered his theory in the light of what is known about the geographical distribution of blackwater fever, and there are many other points against his argument. It seems to the reviewer that, with our present knowledge, it would be most undesirable to exhibit salvarsan in cases of blackwater fever even if they did happen to give a positive Wassermann test.]

A. B.

Barratt (J. O. Wakelin). **Recent Experimental Research bearing upon Blackwater Fever.**—*Ann. Trop. Med. & Parasit.* 1913. Nov. 7. Vol. 7. No. 3B. pp. 367-369.

This short paper is a collection of references to such recent accounts of experimental work on blackwater fever as support the views which the author and Yorke advanced. These were to the effect that haemoglobinuria is preceded by haemoglobinaemia and that suppression of urine is due to mechanical blocking of the uriniferous tubules.

A. B.

Barreto (Manuel Gomes). **Febre Biliosa Hemoglobinurica. Contribuiçao para o Estudo da sua Etiologia.** [Studies on the Etiology of Blackwater Fever.]—*Arquivos do Hygiene e Patologia Exóticas.* 1913. Oct. 31. Vol. 4. pp. 107-117. With 3 plates.

The first part of the paper is a resumé of Stephens's well-known work on this subject.

In Mossamedes, Angola, most cases of blackwater fever were found in the four months from February to June, and frequently at an elevation of 1,500–2,000 feet. The mortality from the disease in this district is a very small one. The author has studied the anopheline fauna of the endemic zone, and he thinks that this is a profitable line of research, as the endemic zone is a limited one and the species of mosquitoes are few. A large number of mosquitoes from this zone were despatched to Colonel Alcock of the London School of Tropical Medicine, who has identified *Anopheles costalis* as the most abundant species. The author thinks there is a connection between the distribution of this anopheline and blackwater fever.

He then studied the changes in the red cells and gives some very poor figures of alterations in the shape of the erythrocytes and of bodies resembling Babesia which he found in them. The paper closes with a history of eight clinical cases of blackwater fever observed by him.

[As far as one can judge, the observations on the changes in shape and composition of the red cells are not of much value.]

P. H. Bahr.

SLEEPING SICKNESS.

i. Le Fanu (C. V.). **Sleeping Sickness in Togo.**

ii. Wade (W. M.). **A Report on Human Trypanosomiasis in the Western Province of Ashanti.**—Reports received at Colonial Office, Nov. 3, 1913.

i. In September 1913 Dr. C. V. Le Fanu had an opportunity of visiting the sleeping sickness camp near Misahöhe in the German colony of Togo. The following is a summary of his report :—

A history is given of the disease in Togo and the administrative measures undertaken to combat it since 1903. In 1908 a sleeping sickness camp was established on the plateau of the Kluto, in the province of Misahöhe.

In this province the percentage of natives infected with sleeping sickness varied from a fraction to 5·9. A larger proportion of cases was found amongst men than women, and amongst adults than children. Two medical officers are engaged in sleeping sickness duty. The senior is responsible for the management of the camp and the treatment of the sick, whilst the junior is engaged in travelling in the province, periodically re-examining patients discharged from medical treatment "under observation," and in collecting new cases which he sends for treatment to the camp.

In September last there were 48 patients in the camp. The total number treated since 1908 is 593. Complete records are available for 355. The earliest cases were treated with atoxyl, the next with arsenophenylglycin, which during the last twelve months has been superseded by salvarsan and neosalvarsan ; these were given at first intravenously, later intramuscularly.

Details are as follows :—

(1) Atoxyl : A total of 15–20 injections up to ·5 gram. each, given every tenth and eleventh day :

No. of Cases.	Cured.	Per cent. cured.
52	30	52·6

(2) Arsenophenylglycin : Two injections on successive days, varying from ·04 gram. to ·06 gram. pro kg. of body weight :

No. of Cases.	Cured.	Per cent. Cured.
233	180	77

(3) Salvarsan :

No. of Cases.	Cured.	Per cent. Cured.
20	19	95

(4) Neosalvarsan :

No. of Cases.	Cured.	Per cent. Cured.
45	37	82

The most recent treatment practised by Dr. von der Hellen is the following :—

(1) On three successive days, three times a day, 2 grams tryparosan.

(2) Next two days, three times a day, 1·1 gm. trypaflavin.

(3) The following day and again two days later, intramuscular injections of neosalvarsan ·025 gm. per kg. of body weight. No records for this last form of treatment are available.

It appears that by far the greater number (95 per cent.) of relapses occur within the first four months after commencenent of treatment. The period of detention in camp is not less than six months, and often as much as, or more than, twelve. Patients "discharged as under observation" are required to report for examination at least once every third month.

ii. Dr. W. M. Wade was appointed in December 1912 to investigate the condition of sleeping sickness in Ashanti, and to compare the present state of affairs with that obtaining in 1910. (See Dr. KINGHORN's report summarised in the *Sleeping Sickness Bulletin.* Vol. 3, p. 133).

A description is given of the country and of the inhabitants, who may be divided into two classes:—(1) the householders and their dependents; (2) the floating population. Many of the latter have travelled great distances; they are as a rule wild, wear little clothing, and are inclined to run away at the approach of a white man, which renders thorough examination of them extremely difficult. The author believes that this class constitute the chief carriers of sleeping sickness in Ashanti.

A list is given of the various tsetse flies caught during the journey. These include *G. palpalis*, *G. pallicera*, *G. longipalpis*, *G. fusca*, and *G. nigrofusca*. The author repeatedly searched for tsetse pupae, but without success.

Writing on the distribution of the disease, Wade states that in his opinion the disease follows the main trade routes and traffic, and that residents becoming infected in the villages on the main roads act as reservoirs for disseminating the disease to susceptible persons in neighbouring villages. The more remote the villages were from the main roads the fewer were the number of infected found.* The routine examination practised was precisely the same as in previous years; namely, house to house visitation, examination of all the inhabitants for glandular enlargements, and puncture of any suspicious glands. The indigenous population gave little trouble as regards examination. Among 39,742 natives examined, 110 (23 old and 87 new) cases of sleeping sickness were found. The new cases (49 males and 38 females) comprised 36 pure North Country natives, 11 Ashantis with a North Country strain, 17 Gamans, 1 Timminy from Sierra Leone, and 22 Ashantis (probably not all these were pure Ashantis).

At least 20 of the 97 cases found in 1910 are still alive, and nine at least of the 32 found in 1911-12. On going through these cases it is noticeable that, in the absence of treatment, North Country natives seem to succumb to the disease more quickly than the indigenous natives.

There are two kinds of cattle seen in this Province, viz., the North Country Moshi cattle, brought to the country to be slaughtered, and the small cattle indigenous to the Province, called Gaman cattle. The former on their arrival are in excellent condition, but soon become thin, and in the author's experience, are constantly infected with trypanosomes, whilst the small indigenous cattle thrive and breed in the province.

As a prophylactic measure it is recommended that 100 yards clearings be made around all villages and zongos on the main trade roads and around all bush villages where there are cases of sleeping sickness, and that these clearings when made be properly maintained; and 50 yards clearings around the water supplies and working places of all these villages. Segregation of infected cases is impracticable;

*KINGHORN wrote of Ashanti that the disease was as commonly found in villages off the beaten tracks as in those situated along the highway. A.G.B.

even in the case of infected residents it could only be carried into effect by the use of strong measures, and there would always remain the floating population, which is probably the greatest danger as a reservoir of the infection.

The author believes that the new roads which are at present being made through the forest constitute a danger as regards trypanosomiasis. Moving objects seem to be a greater attraction for tsetse flies on these broad sunlit roads than in the dark ones, whilst on each side of the roads, where the forest has been cleared back for a few yards, there is now a tangled mass of moisture-laden vegetation, shaded by the branching trees and forming an ideal habitat for tsetse flies. If railways could be run through the endemic areas where North Country natives are employed in large numbers, Wade believes that there would quickly be a diminution in the North Country population and also in the incidence of the disease.

W. Yorke.

Sant'ana (J. Firmino). **A Tripanosomíase Humana da Rhodésia Crónica e particularidades da Epidemia, no que interessa ao Território Português da Africa Oriental.** [Human Trypanosomiasis of Rhodesia; the History and Details of the Epidemic, as far as concerns the Territory of Portuguese East Africa.]—*Arquivos de Higiene e Patologia Exóticas.* 1913. Vol. 4. pp. 3-50. With 1 map.

In the latter part of this paper the author describes the precautions which are being taken to prevent the spread of sleeping sickness in Portuguese East Africa. The necessary insect is present in *Glossina morsitans*, which has been discovered at various points near the course of the Zambesi. *G. pallidipes* and *G. fusca* are also to be found near the coast. Consequently, it only requires the introduction into the colony of infected human beings for the disease to become prevalent.

As can be seen from the map, the north-west portion of Portuguese East Africa projects into Rhodesia between Nyasaland and the Salisbury district, and there is a constant traffic of natives across this neck of land, in the neighbourhood of Tete. As sleeping sickness is known to prevail on the western shore of Lake Nyasa, and also along the river Luangwa in Rhodesian territory, the situation is described as full of danger for Portuguese interests. A sanitary service for inspection and control is consequently being set up in this district by the Portuguese Government.

Sleeping sickness also exists in German territory, close to the Portuguese boundary, which is formed by the river Rovuma. *G. morsitans* being plentiful in Portuguese territory just south of this river, precautions in this quarter are also indicated.

Only four cases of sleeping sickness have so far been recognised within the territory of Portuguese East Africa, and of these particulars are given.* The infection could be traced in every instance to residence within Rhodesian territory, at places where the disease was known to exist.

J. B. Nias.

* The case of the elephant hunter who was infected in Portuguese territory is not mentioned (see *Sleeping Sickness Bulletin*, Vol 4. p. 266). A. G. B.

Van den Branden (F.). **Note préliminaire sur quelques Essais de Traitement de la Trypanose Humaine par Salvarsankupfer.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Dec. Vol. 17. No. 24. pp. 845-849

In this paper a preliminary account is given of the therapeutic action of Salvarsankupfer (" K3 ") in sleeping sickness. This drug, which was obtained from Ehrlich, is a combination of salvarsan and copper. Directions for its administration are given. It is more active than salvarsan, but at the same time more toxic. Ehrlich recommends that not more than 0·05 gm. should be given ; the author however administered larger doses, up to 0·3 gm.

The drug was found to clear the gland juice of trypanosomes within five minutes, even when given in doses less than 0·005 gm. per kilo of body weight. It was easily tolerated by infected natives. Two patients out of 35 vomited about three hours after the injection, but this gastric reaction was transient. There was usually a slight febrile reaction to 37·5° C ; no albuminuria was observed. One patient died of arsenical poisoning three days after treatment ; at the post-mortem examination acute yellow atrophy of the liver was found ; the amount of drug given in this case was 0·005 gm. per kilo of body weight. The general condition of the patient at the time of injection was good, the nervous system not being invaded by parasites. Other patients tolerated larger doses of the drug (·006 gm. per kilo). It appears that 0·005 gm. per kilo is a dose which should be not exceeded.

The results of treating 14 patients with various doses of the drug are given in tables. Three patients received at a single injection 0·1 gm. of the drug ; two of these relapsed after a month, whilst in the third trypanosomes had not reappeared up to the 72nd day. Two patients who received two consecutive injections of 0·1 gm. had not relapsed three months later, nor had two others who received a single injection of 0·2 gm. Of two cases who received three consecutive injections of 0·1 gm. one relapsed after a month, whilst the other was still negative at the end of two-and-a-half months. Five patients received a single dose of 0·3 gm ; one relapsed on the 45th day, the others were still negative on the 82nd, 81st, 75th and 76th days respectively.

The author points out that the periods during which the cases were under observation is short ; he intends to give the ultimate results in a future paper.

Ehrlich informed the author that the drug with which these experiments were performed was manufactured on a large scale, and is less active than that previously prepared in small amounts. He is to supply a further quantity of freshly prepared " K3," with which the author intends to repeat his experiments.

W. Y.

Balfour (Andrew). **Recent Views on Syphilis, Spirochaetes, and Sleeping Sickness** [Correspondence.]—*Brit. Med. Jl.* 1913. Dec. 13. pp. 1560-1561.

The major part of this paper is occupied with a discussion of the possibility of finding a substance capable of acting as a " carrier " for drugs used in the treatment of syphilis. The need is to find such a carrier in order that drugs used may reach the cytoplasm of the spore

or granule phases of the syphilis organisms, and bring about their destruction.

The action of urotropin as a trypanocide is now being tested in cases of sleeping sickness in the Southern Sudan. As it readily penetrates the spinal membranes, the drug may be of service as a "carrier," even if it has no direct trypanocidal action.

H. B. Fantham.

Grossule (Virgilio). **Esperienza sulle Scimmie col Siero Mehnarto contro la Malattia del Sonno.** [Experiments on Monkeys with Mehnarto's Sleeping Sickness Serum].—*Gazz. d. Ospedali e d. Cliniche.* 1913. Oct. 23. Vol. 34. No. 127. p. 1327.

In 1912, some tubes of serum prepared by Dr. Mehnarto, for use in sleeping sickness were forwarded by a colleague of the author, with a request that he should experiment with it in the hospital at Stanleyville. A description of the appearance of the serum is given, and the instructions for use accompany it. It was tried on two monkeys which had been inoculated from two patients infected with *T. gambiense*. Intramuscular and subcutaneous injections had no effect on the parasites. The conclusion is that Mehnarto's serum, the composition of which is not stated by him, has no power against the trypanosomes of sleeping sickness, and cannot be injected intravenously as Mehnarto advises, on account of the flocculi suspended in the liquid.

W. Y.

Blacklock (B.) & Yorke (W.). *Trypanosoma vivax* **in Rabbits.** —*Ann. Trop. Med. & Parasitol.* 1913. Dec. 30. Vol. 7. No. 4. pp. 563-568.

The trypanosome with which this article deals was isolated from a horse naturally infected in the Gambia (*Sleeping Sickness Bulletin*, Vol. 4, p. 68). From that time (June 14, 1911) up to the present, the strain has been preserved by passage through a series of 39 goats. In spite of direct inoculation of the trypanosome from goat to goat, during a period of nearly two and a half years, no appreciable increase of virulence was observed. The average duration of the disease in the first 14 animals was 31 days, whilst that in the last 14 was 29 days.

Attempts to infect rabbits, made in the earlier passages of the strain through goats, either failed entirely or resulted in a temporary infection in which the parasites were exceedingly scarce and disappeared after a few days. It was not possible to carry on the strain to a second generation in rabbits.

Inoculations made from the 38th goat proved, however, more successful, and four rabbits injected intraperitoneally with small amounts (0·5 to 1 cc.) of the goat's blood all became infected after incubation periods of five to eight days. The infection in all was well marked, and as many as twenty parasites to the microscope field were seen in the peripheral blood. Sub-inoculations were made from one of these rabbits, with positive results. The strain was carried on in rabbits over a period of more than three months, until the eighth generation. Details are given in a table.

Although the strain has not yet become invariably pathogenic for rabbits, nevertheless most of the animals inoculated developed a

definite infection, and in five the disease ran an acute course, the animals dying in from 5 to 20 days with numerous parasites in the peripheral blood.

As a general rule this trypanosome in rabbits did not exhibit the rapidity of movement which is characteristic of it in goat's blood. In stained preparations the parasites were identical with those seen in goat's blood. H. B. F.

Blacklock (B.) & Yorke (W.). **The Probable Identity of *Trypanosoma congolense* (Broden) and *T. nanum* (Laveran).**—*Ann. Trop. Med. & Parasitol.* 1913. Dec. 30. Vol. 7. No. 4. pp. 603-607.

The authors regard *T. dimorphon* (sensu Laveran and Mesnil), *T. confusum* (Montgomery & Kinghorn), and *T. pecorum* (Bruce) as synonymous with *T. congolense*. They point out that the sole distinguishing feature of this parasite from *T. nanum* (Laveran) is one of pathogenicity, *T. congolense* being described as pathogenic for monkeys, dogs, rabbits, guinea-pigs, rats and mice, while *T. nanum* is considered to be incapable of infecting these animals.

An account is given of the manner in which various animals reacted to a short aflagellar trypanosome indistinguishable morphologically from *T. congolense* or *T. nanum*—from the time of its isolation from a naturally infected horse [see *Sleeping Sickness Bulletin*, Vol. 4 pp. 68, 228] until the strain had been passed through a series of 51 laboratory animals during a period of 18 months. Details are set forth in a table. A study of this table reveals two facts :—(1) Most of the early inoculations failed to infect, whereas the later were invariably successful ; (2) the course of the infection in the earlier cases was chronic, whereas that in the later instances was acute. The average length of life of the first ten rats, from the fifth generation to the fourteenth, was 88·6 days, while that of the last ten rats, comprising the 42nd to the 51st generation, was only 8·6 days. By passage through laboratory animals the trypanosome was changed from one of uncertain and chronic pathogenicity to one of great virulence. The authors point out that one or two sub-inoculations from a naturally infected animal may not afford any conclusive evidence as to whether or not the trypanosome is pathogenic for small laboratory animals. Had the number of their experimental animals been limited, they would probably have designated this parasite *T. nanum*. Further experiments, however, showed that the trypanosome could be made acutely pathogenic to small laboratory animals.

Reference is made to the variation in virulence of other strains of short aflagellar trypanosomes, noted by Weissenborn and the Sleeping Sickness Commission of the Royal Society.

In conclusion, the authors write : " We can see no evidence which would justify distinguishing one from the other on the ground of pathogenicity. In the present state of our knowledge we can only conclude that *T. congolense* and *T. nanum* are the same parasite."
H. B. F.

Pringault (E.). **Existence en France du *Trypanosoma vespertilionis* Battaglia.**—*Compt. Rend. Soc. Biol.* 1913. Dec. 26. Vol. 75. No. 37. pp. 663-665.

The author found a heavy infection of *Trypanosoma vespertilionis* in

a young bat, *Vesperugo kuhli*, captured in the neighbourhood of Marseilles. Most of the trypanosomes were small, about 17μ long. It was found possible to keep some of the parasites alive for five days in a fresh preparation, luted with paraffin. The behaviour of the parasite at different temperatures was investigated. This is the first record of the trypanosome in France. H. B. F.

Mesnil (Felix). **Sur le Nagana de l'Ouganda.**—*Bull. Soc. Path. Exot.* 1913. Dec. Vol. 6. No. 10. pp. 685-689.

Reference is made to the work of Bruce, Hamerton, Bateman and Mackie, indicating that the trypanosome found by them in a Uganda ox in 1909 is identical with that with which Bruce worked in Zululand 15 years previously, and to the work of Stephens and Blacklock, showing that the Uganda trypanosome differs from the monmorphic parasite sent to England by Bruce, and described by Plimmer and Bradford as *T. brucei*.

The author considered that it would be of advantage to submit the two trypanosomes (of Zululand and of Uganda), the identity of which is a matter of dispute, to biological tests. Laveran has already shown that two sheep immunised against nagana (var. ferox) were as susceptible to *T. rhodesiense* as normal sheep. [See *Sleeping Sickness Bulletin*, Vol. 4, p. 135.]

Three goats were inoculated, the first with the virus of Uganda, the second with a trypanosome of the *brucei* type, and the third with nagana (var. ferox), in order to compare the first two parasites and incidentally to show the affinities of nagana ferox with the nagana type. As the first two goats died from the infection, the crossed immunity tests could not be undertaken. The third goat recovered not only from its infection of nagana ferox, but also from an infection of the nagana type (or mixed infection ?). When subsequently inoculated with the Uganda virus this goat became ill and died ; hence the author concludes that the Uganda virus is distinct from that of nagana. During the course of the infections the goats were bled frequently, and the protective action of the sera examined as regards the three trypanosomes. The serum of the animal infected with the Uganda trypanosome did not protect mice against the nagana trypanosome, and conversely that of the goats infected with nagana did not protect mice against the Uganda virus. The reactions done with nagana and nagana ferox were, in general, positive indicating the identity of the two. These experiments suggest that the virus of Uganda is different from nagana ; it must rather be compared with *T. rhodesiense*. W. Y.

Macfie (J. W. Scott) & Johnston (J. E. L.). **A Case of Equine Trypanosomiasis characterised by the Occurrence of Posterior Nuclear Forms**—*Jl. Trop. Med. & Hygiene.* 1913. Nov. 15. Vol. 16. No. 22. pp. 348-349. With 1 text fig.

Attention is drawn to the fact that with the exception of the parasite found by Macfie in a horse infected in Northern Nigeria [see this *Bulletin*, Vol. 1, p. 674], the occurrence of trypanosomes exhibiting posterior nuclear forms has not been described from West Africa.

In this paper an account is given of a trypanosome infecting two horses at Accra, Gold Coast. The parasites were found to be of the *T. brucei* (*pecaudi*) type. Numerous trypanosomes were present in the slides made from the blood of one of the horses, and examination revealed the presence of 4·8 per cent. of definitely posterior nuclear forms. This species is probably that for which Stephens and Blacklock proposed the name *T. ugandae* [see this *Bulletin*, Vol. 1, p. 662], considered by some to be identical with *T. pecaudi*. The authors believe that this trypanosome is a common parasite of domestic animals in the West African Colonies. If it is identical with *T. rhodesiense*, it is a curious fact that human trypanosomiasis in West Africa appears to differ materially from that in Rhodesia. Again, if *T. rhodesiense* is *T. brucei* (*pecaudi*), we might be expected to find cases of *T. rhodesiense* infection in man in places where *T. brucei* is common in domestic stock, but this is not the case. The trypanosome from a case of sleeping sickness in Southern Nigeria was studied; neither in its measurements, its morphology, nor in its animal reactions did it resemble *T. brucei* (*pecaudi*) or *T. rhodesiense*.

W. Y.

Sant'ana (J. F.). **Observações sôbre as Forms não Flageladas do *Trypanosoma rhodesiense* nos Animais de Experiencia e em Especial no Rato.** [Observations on Non-flagellar Forms of *T. rhodesiense* in experimental Animals.]—*Arquivos de Higiene e Patologia Exoticas.* 1913. Oct. 31. Vol. 4. pp. 77-105. With 3 coloured plates.

The author gives first a long historical resumé of the work relating to plasmodial, encysted, and intracellular forms of trypanosomes, the latent bodies of Moore and Breinl, and various resistant and multiplicative stages of many different trypanosomes as observed by numerous workers. The strain of trypanosomes used by him was obtained from Tete, Portuguese East Africa, near the Rhodesian frontier. It had the morphological features of *T. rhodesiense*, and the flagellate showed the characteristic polymorphism, long, stumpy, and posterior nuclear forms being observed. Sub-inoculated animals were very sensitive to the virus.

Rounded forms of the trypanosome were seen in the circulating blood and in the internal organs. They were most abundant in the organs at the periods of minimum numbers of trypanosomes in the peripheral blood. Amoeboid, nonflagellate forms were seen in the lungs and less frequently in the liver and spleen. Intracellular, rounded forms were observed in polynuclear leucocytes and myelocytes in the spleen, liver and bone-marrow. Apparently they were in process of phagocytosis.

The rounded body often contained a nucleus but no blepharoplast; at other times a blepharoplast was present. An outer sheath to the rounded body, suggestive of a capsule or cyst membrane, was said to be formed by the remains of the undulating membrane. The illustrations show many forms with chromatinic fragmentation, and some with vacuolated protoplasm.

The author considers that the rounded forms of *T. rhodesiense* observed by him result from partial degeneration of the flagellate forms, and states that they "show notable analogies with the involutive phenomena seen in dying animals or those a short time dead." [It is obvious from the description of the phenomena of formation of these rounded bodies, and from careful inspection of the accompanying plates, that the non-flagellate forms are rightly described by the author as degeneration forms. They are certainly not identical with true, latent, leishmania-like or evolutionary (cyclical) forms described by other workers.]

H. B. F.

Parparcone (Ernesto). **Ricerche Sperimentali sul Nagana. IV Communicazione. Lesione occulari per infezione generale da** *Trypanosoma brucei*. [Ocular Lesions in General Infection with *T. brucei*]. —*Sperimentale*. 1913. Dec. 17. Vol. 67. No. 6. pp. 933-942.

In guinea-pigs and rats the development of the disease was so rapid that the ocular lesions and lesions of the nervous system were not developed. In rabbits and dogs, however, in which the disease was more chronic, ocular lesions were constantly observed. The eyelids, corneae, and aqueous humour were all affected. The conclusions are :

1.—In experimental infection with *T. brucei* (Nagana) in rabbits and dogs, the eye tissues show changes : blepharitis, conjunctivitis, very intense and diffuse parenchymatous keratitis, irido-cyclitis, choroiditis, etc.

2.—Trypanosomes are present in the conjunctival secretion and in the aqueous humour, as shown by stained preparations, and injection into animals.

3.—They are also demonstrable in the cornea, both at the first onset of the keratitis when the cornea is still transparent and devoid of blood vessels and when the keratitis is very marked. The interstitial lesions of the cornea are due to proliferation of the parasites in the corneal parenchyma, and to their toxic products. One can produce keratitis with extracts of trypanosomes.

4.—The aqueous humour of animals infected by various routes contains trypanosomes ; one can infect animals by injecting trypanosomes into the anterior chamber.

W. Y.

Goretti (Guido). **Ricerche Sperimentali sul Nagana. III Communicazione. Contributo allo Studio delle Alterazione del Sistema Nervoso Centrale nell'Infezione sperimentale da Nagana.** (*Trypanosoma brucei*). [The Study of Alterations of the Central Nervous System in Experimental Infection with Nagana (*T. brucei*.]— *Sperimentale*. 1913. Nov. 13. Vol. 67. No. 5. pp. 527-564.

The author gives an account of the work of other investigators. He examined the nervous system of many rats, eight guinea-pigs, six rabbits, and five dogs, and in the present paper gives an account of his findings in detail, with the technique adopted. His conclusions are as follows :—

In rabbits, guinea-pigs and dogs experimentally infected with nagana, serious changes in the central nervous system are :

1.—Marked chromatolysis of the cellular elements generally.

2.—Moderate infiltration of plasma cells and lymphocytes in the meninges and around the capillaries of the central nervous system ; similar elements are found also free in the lumen of the vessels. Besides this a moderate number of " Stäbchenzellen " are scattered here and there in the nervous system, especially in the brain of dogs.

3.—Diffuse lesions—demonstrable by methods I of Donaggio, and Marchi—affecting the myeline fibres of the brain, of the various tracts of the spinal cord, of the bulb, of the pons, of the mesencephalon, of the spinal nerve roots, and of the cranial nerves.

4.—Sometimes more advanced lesions of a bilateral character are demonstrable by the method of Weigert, in the crossed pyramidal tracts. Such lesions may also affect in a lesser degree the posterior nerve roots and the posterior tracts of the cord itself when the lesions of the pyramidal tracts are more extensive.

5.—A proliferation to a slight degree of the neuroglia.

6.—Such lesions are at least partly secondary in nature and in all probability are due to toxic products set free by the trypanosomes, toxic products which are seen to have a powerful and deleterious effect on the central nervous system.

W. Y.

Levaditi (C.) & Mutermilch (St.). **Recherches sur la Production des Anticorps chez les Animaux Trypanosomiés et traités par le Salvarsan.**—*Bull. Soc. Path. Exot.* 1913. Dec. Vol. 6. No. 10. pp. 699-704.

The serum of rats infected with nagana and treated by intraperitoneal injection of salvarsan was found to be trypanocidal *in vitro* shortly (two hours) after the administration of the medicant. This trypanocidal action is not due to a true antibody, as instead of being inactivated by heating to 55° C. it becomes, on the contrary, intensified. It is probably to be explained by the circulation in the blood of salvarsan or some derivative of it. This property diminished in proportion to the length of time which elapses after the injection of the drug, and disappears altogether after about 30 hours.

The true antibodies appear in the blood about the fifth day after inoculation of the virus, and the time is unaltered whether the drug is given at the beginning of the infection, when parasites are very few, or later, when they are exceedingly numerous. The antibodies make their appearance on the day which corresponds with the crisis which occurs spontaneously in untreated animals (*i.e.* in those animals which exhibit such crises, *e.g.* guinea-pigs and rabbits). It seems as if the organism responds to the stimulus of the antigen and manufactures defensive substances, which appear after a period of incubation which is always the same. The setting free of a considerable mass of antigen following the destruction of the trypanosomes by a drug hardly influences the genesis of the antibodies ; it neither accelerates their appearance nor increases their intensity.

Details of the experiments upon which these conclusions are based are given in tables.

W. Y.

LAVERAN (A.) **Trypanotoxines. Essais d'Immunisation contre les Trypanosomes.**—*Bull. Soc. Path. Exot.* 1913. Dec. Vol. 6. No. 10. pp. 693-698.

An attempt was made to confirm the work of SCHILLING and RONDONI [see this *Bulletin*, Vol. 2, p. 356], which showed that heating trypanosomes of nagana to 37° C. for some hours gave rise to the formation of a toxin, capable of killing mice in 24 to 48 hours. This toxin is thermolabile, being destroyed by heating to 56° C. for 30 minutes. Inoculation of small sublethal doses of the mixture, heated to 37° C., produced immunity against nagana.

Laveran gives details of two experiments made by him with the strain nagana ferox of EHRLICH in his attempt to corroborate the work of SCHILLING and RONDONI; the results obtained by him were, however, quite different. Of 29 mice which had been injected with ·25cc. to 1cc. of the trypanosome bouillon mixture heated to 37° C. for one and a half to five hours, not a single one died, or even presented morbid symptoms attributable to a slight intoxication.

It is noted that the length of time necessary to heat at 37° C. in order to destroy the virulence of the trypanosomes is very variable; in some cases two and a half to three hours is sufficient, whilst in others four to five hours is insufficient.

A number (15) of mice, which had survived the injection of the heated trypanosome bouillon mixture, were inoculated seven to eight days later with a small dose of the virus of nagana; all died of the disease within six days.

Laveran points out that these results agree with those obtained by most other workers who have endeavoured by the inoculation of the dead parasites to produce immunisation against trypanosomes. After briefly reviewing the literature of the subject, he concludes by stating that efforts to immunise by means of dead trypanosomes, when they have not been absolutely negative, have given merely partial and incomplete results.

W. Y.

STOLOWSKY. **Bericht über einen Versuch zur Ausrottung der *Glossina palpalis* durch Wegfangen.** [An Attempt to Exterminate *Glossina palpalis* by Capture.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1913. Dec. Vol. 17. No. 24. pp. 856-860.

The author points out that for an experiment of this kind an island is needed which is not visited by boats nor near enough to other Glossina-infested land to permit of the approach of *palpalis* by flight. The small rocky island of Kamanda, near Kirando, on the eastern shore of Lake Tanganyika, corresponded to these conditions. This had been uninhabited for years, was not visited by fishermen, and was removed from the nearest inhabited island by about half a mile. Kamanda is described as an island which takes 15 minutes to go round; it is covered with bush vegetation. The conditions were unfavourable for the experiment, because the shore was strewn with large rocks, amongst which the fly could find shelter and where the fly-catchers could not reach them. The island was visited almost daily by two fly-catchers and the spoils were counted in the evening. Between

August 1912 and April 1913, that is, about eight months, 6,165 *palpalis* were caught, 4,844 male and 1,321 female; that is, 3·5 male : 1 female. The most favourable results were obtained in August, when the catch averaged 100 flies and more; in November to January it was 10 to 20; afterwards it increased again. A fortnight after the close of the operations a single practised fly-catcher caught 43 flies, and later two fly catchers caught 86. It is seen that the flies had not been notably diminished, much less exterminated. The author thinks the experiment might have succeeded had there been less shelter for the flies, but that the clearing of vegetation is a simpler and more rapid method.

He notes that twice as many flies were caught in the morning as in the afternoon. He remarks on the large number considering the few opportunities of obtaining food. There were no warm-blooded animals except birds, unless perhaps a few small rodents; blood, he thinks, was supplied almost exclusively by crocodiles. The gut contained in a large percentage "sexual" forms of the crocodile trypanosome, *T. grayi* Novy. Finally he notes the existence of an island on which the conditions appeared eminently favourable for *G. palpalis*, but where this species was not found. This island, called Muila, which resembled Kamanda, was about 300 metres from another island, Kilenge, on which there was an abundance of *palpalis*. There was regular traffic between Kilenge and Muila, and goats were pastured here. This island, like all similar ones on Tanganyika, abounds in crocodiles.

A. G. B.

Torres (Margarinos). **Molestia de "Carlos Chagas." Transmissao do *T. cruzi* pela Picada do *T. megista*.**—[Chagas's Disease. Transmission of *Trypanosoma cruzi* by the Bite of *T. megista*.]—*Brazil Medico*. 1913. Aug. 15. Vol. 27. No. 31. p. 321.

A preliminary note in which the author announces that he has succeeded in infecting kittens with *T. cruzi* by the bite of the *barbeiro*. The insects were confined in narrow glass tubes, one in each, the mouth of the tube being closed with gauze. All infection of the kitten by the faeces of the *barbeiro* was thus prevented, the insect merely thrusting its proboscis through the mesh of the gauze. Of 35 different insects thus tested on the same number of kittens, 19 gave a positive result, and 13 a negative.

J. B. N.

Neiva (Arthur). **Transmissao do *Trypanosoma cruzi* pelo *Rhipicephalus sanguineus* (Latr.)** (Nota prévia). [Transmission of *T. cruzi* by *R. sanguineus*.]—*Brazil Medico*. 1913. Dec. 8. Vol. 27. No. 46. p. 498.

A dog which had been sent to the Oswaldo Cruz Institute, after having been experimentally infected with *T. cruzi*, was found to be in addition naturally infected with *Piroplasma vitali*. In due course of time it died, and upon its body were found five ticks of the species *Rhipicephalus sanguineus*. These were collected and placed upon another dog, previously ascertained to be healthy, in order to see

whether *P. vitali* could be thus transmitted. Instead, it was found, about a fortnight afterwards, that the dog was infected with *T. cruzi*. As it does not seem to have been hitherto shown that ticks can convey trypanosomes, the author thinks the observation worth putting upon record. The tick in question is common upon dogs in Brazil, and also, according to NEUMANN, is parasitic on man.

J. B. N.

BOOK REVIEW.

MEDIZINAL-BERICHTE **ueber die Deutschen Schutzgebiete (Deutsch-Ostafrika, Kamerun, Togo, Deutsch-Südwestafrika, Deutsch-Neuguinea, Karolinen, Marshall- und Palau-Inseln und Samoa) für das Jahr 1910/11. Herausgegeben vom Reichs-Kolonialamt.** [German Colonial Medical Reports for the year 1910-1911.]—xii + 808 pp. With 29 text-figs. and 5 plates. 1913. Berlin: Ernst Siegfried Mittler u. Sohn. [Price not stated].

German East Africa.—The European population of German East Africa numbers about 4,500, which include 200 troops; their death rate was 21 per thousand. The coloured population amounts to seven and three-quarters millions. Malaria is prevalent and causes about one-third of the total sickness, but only one-sixth of the mortality. Among the white inhabitants there were recorded 1,048 attacks of malaria and seven deaths, and also 56 admissions and eight deaths on account of blackwater fever. Tanga and Daressalam are both highly malarious; 76 per cent. of the Europeans in the former and 48 per cent. in the latter being the rates of incidence; 25 cases of blackwater fever with six deaths occurred in these two localities. At Tanga, 29 per cent. of adult natives and 43 per cent. of the children were malarial carriers; at Daressalam, 15 per cent. of the European adults, 23 per cent. of their children, and 21 per cent. of the natives were carriers. The malignant tertian parasite is found in the large majority of instances. Among the blacks, 26 cases of blackwater fever with four deaths were reported. Wilhelmstal, which is at an altitude of 1,450 metres, is free from malaria.

Experiments with the Azolla water-weed for the suppression of mosquitoes failed, since its growth is too slow. "Schnaken-Saprol" is cheaper and better than petroleum for the destruction of larvae. About five per cent. only of the whites take quinine prophylactically.

Along the south of Lake Victoria sleeping sickness is not endemic, but north of the island Meissome *Glossina palpalis* is common, and four human trypanosome carriers were found. Three thousand five hundred and seventy-three cases of sleeping sickness were under treatment, 673 of whom are recorded as having recovered, and 480 died. No Europeans were attacked. Two thousand five hundred and seventy-five cases and 274 deaths occurred on the shores of Lake Tanganyika. In the Bukoba district there were 524 cases and 89 deaths, and in Schirati 474 cases and 117 deaths. Atoxyl is the best remedy; given in doses of 0·5 gm. every fortnight until 8 gm. have been administered, the infection becomes quiescent. By-symptoms developed in a small proportion of the cases only. Unfortunately, in most of the patients, trypanosomes reappeared. Atoxyl combined with mercury or antimony has yielded no better results. Of 35 people treated with arsenophenylglycin, 16 died, six from the effects of

the remedy; only one seemed to be benefited. A Director and eight Sanitary Officers and 16 Assistants were employed on Sleeping Sickness duty, and 320,000 marks were expended.

There were 560 cases of smallpox with 163 deaths among the natives, but the Europeans were exempt. In the years 1909-1911, 1,753,278 vaccinations were performed, or 22·7 per cent. of the population were vaccinated. The lymph used for this purpose was mostly prepared locally. A calf was inoculated with pus of smallpox, and after two passages the lymph was employed as vaccine. Glycerine was added as a preservative. Passage through a pig or donkey restores the activity of the vaccine if this has been lowered.

Plague broke out at Lindi and Muansa, but only 18 attacks and 15 deaths were reported. 193,783 rats were examined; there was no *M. rattus* among them, but the *Mus decumanus* is a domestic rat in German East Africa. Rat-plague was discovered in both Lindi and Muansa. *Xenopsylla cheopis* was present in 87 per cent. of 92 rats examined, but their number was not great.

Relapsing fever is prevalent, and is transmitted by the *Ornithodorus moubata*. There is little enteric fever in the colony; only 30 cases and one death occurred in the Europeans. Dysentery caused 50 admissions and two deaths among them, and is prevalent among the natives; the amoebic form is more common than the bacillary.

Filariasis is endemic; 50 per cent. of the natives of the Bukoba district harbour *F. perstans*.

Worms and yaws are the causes of much sickness. Ankylostomiasis is extending from the coast inland. At Lindi, 20 per cent. of 3,243 natives were carriers. Tapeworm is common in both Europeans and Blacks. Bilharzia occurs, and in the vicinity of Massassi almost every child is infected.

In parts, 50 per cent. of the inhabitants are syphilitic. Goitre is frequently seen in the hilly districts.

Tick-borne diseases cause great mortality in stock. Coast fever, Texas fever, and piroplasmosis of horses, mules, dogs and asses are prevalent. Trypanosomiasis of these animals also occurs. A disease resembling rinderpest in many respects is extending in parts. Fowl cholera and avian diphtheria are present in several districts.

Kamerun.—Of the 1,405 Europeans in Kamerun, 29 died. Malaria was the chief cause of sickness, and gave rise to 151 admissions. Thirteen attacks of blackwater fever, which all ended in recovery, are recorded. The rainy season, May to October, is the most unhealthy time of the year, when malaria and dysentery are epidemic. The malarial index of some districts is as high as 70 per cent., and an altitude of 1,400 metres affords no immunity.

Vaccination is doing much to stamp out smallpox, which was rampant in years past; only 18 cases are reported. 122,340 vaccinations with lymph, prepared locally, were performed, with success in 70 per cent.; vaccine obtained from Germany gave 90 per cent. of failures.

Leprosy is common among the natives, but they resist all measures for its prevention. A leper home has been established at Jaunde, and 262 lepers have been treated.

Filariasis, ankylostomiasis, venereal diseases, and yaws are widespread.

An outbreak of sleeping sickness occurred at Akonolinga, where 230 cases were collected in a month. The infected area, a chart of which is given, lies on the banks of the river Dume and its tributaries. Since the sleeping sickness camp was opened 416 patients have been treated, by atoxyl chiefly; 37 recovered apparently. Seventeen cases of blindness following atoxyl are noted.

Animal trypanosomiasis and piroplasmosis are found in many parts.

A list of the blood-sucking insects of Kamerun and of their habitats is given.

Togo.—In Togo the 633 Europeans suffered from 696 attacks of illness, mostly caused by malaria, but there were only three deaths.

Cases of fever remaining high for several days complicated with albuminuria are frequently observed. One resembling Malta fever was noted. Malaria is almost universal among the native children. Amoebic

dysentery, ankylostomiasis, ascaridiasis, syphilis, and yaws are common diseases of the native population.

South West Africa.—In German South-West Africa, the number of whites has risen from 5,000 in 1902 to 13,962 in 1911, which includes 2,291 troops. There is a native population of 33,344. There were 137 deaths in the Europeans, but many were those of infants, the mortality of whom was 20–25 per cent. Enteric fever and dysentery prevail throughout the Colony. Malaria caused 333 admissions and one death among the Europeans; it is limited almost entirely to the north. Fifteen cases of Malta fever arose among the whites through drinking goat's milk. The natives suffer severely from scurvy, due to the scarcity of vegetables and fresh meat. Tubercle, rheumatic fever and tapeworm are prevalent. One case of bilharzia of local origin has been noted. The water in many parts is brackish, and contains as much as 607 gm. of chlorine per litre; diarrhœa is of frequent occurrence. Influenza was epidemic in the winter.

German New Guinea and South Sea Islands.—There were 20 deaths among the 509 Europeans residing in German New Guinea, but they were mostly due to causes independent of climate. Malaria is prevalent, especially in January at the height of the rainy season; 140 attacks occurred in the whites. A few cases of blackwater fever came under notice. Yaws, ringworm, Tinea imbricata, scabies, pemphigus, eczema, and ulcers which have the local name of "kaskas" are widespread.

The commonest diseases of the West Caroline Islands are tubercle, granular ophthalmia, yaws, tinea, and scabies. In the East Caroline Islands, in addition to these, malaria also prevails.

In July 1910, a fatal epidemic swept through the Marshall Islands, which resembled yellow fever in jaundice and haematuria being frequent symptoms. Fish poisoning is often observed; colic, collapse, anaesthesia of the extremities, followed by ascending paralysis which ends fatally, are the chief features of these cases.

In Samoa, there are 1,473 whites and 35,661 coloured people. There is no malaria, since there are no anophelines on the island. Only three cases of enteric fever are reported. Bacillary dysentery sometimes occurs. Among the native population, filariasis, ankylostomiasis, and leprosy are diseases of common occurrence. The island, however, is very healthy; there were only four deaths among the Europeans during the year.

C. Birt.

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BOOKS RECEIVED.

FRASER (Henry) [M.D., Director.] Twelfth Annual Report of the Institute for Medical Research, Kuala Lumpur, Federated Malay States, 1912.—71 pp. 8vo., 1913. Kuala Lumpur: F. M. S. Government Printing Office. [Price not stated.]

HOLMES (Major J. D. E.) M.A., D.Sc., M.R.C.V.S., Imperial Bacteriologist.] A Description of the Imperial Bacteriological Laboratory, Muktesar: its Work and Products.—47 pp. With 33 plates. 1913. Calcutta: Superintendent Government Printing. [Price 8 annas, or 9*d.*]

VEDDER (Edward B.) [A.M., M.D. Captain Medical Corps, U.S. Army.] Beri-beri.—viii + 427 pp. With 51 text figs. 1 folding chart, and 5 coloured plates. 1913. London: John Bale, Sons & Danielsson, Ltd. [18*s.* net.]

STRACHAN (Henry) [C.M.G.] Lessons in Elementary Tropical Hygiene for the use of Pupils in Tropical Schools.—xii + 116 pp. crown 8vo. With 6 plates. 1913. London: Constable & Co., Ltd. [1*s.*net.]

FROES (Dr. Joao A. G.) Hemodiagnostico nos Tropicos. Liçoes Professadas na Faculdade de Medicini da Bahia. iii + 138 pp. 1913. Bahia: Livraria Catilina.

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The TITLE PAGE and INDEX of Vol. II. will be issued with the Bulletin for February 28.